SOIL SURVEY

Schoharie County New York

OUR SOIL ★ OUR STRENGTH

Issued September 1969

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
CORNELL UNIVERSITY
Agricultural Experiment Station

Major fieldwork for this soil survey was done in the period 1940–64. Soil names and descriptions were approved in 1966. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1966. This survey of Schoharie County was made cooperatively by the Soil Conservation Service and Cornell University Agricultural Experiment Station; it is part of the technical assistance furnished by the Soil Conservation Service to the Schoharie County Soil and Water Conservation District.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY of Schoharie County contains information that can be applied in managing farms, ranches, and woodlands; in selecting sites for roads, ponds, buildings, or other structures; and in estimating the suitability of tracts of land for agriculture, industry, or recreation.

Locating Soils

All of the soils of Schoharie County are shown on the detailed map at the back of this survey. This map consists of many sheets that are made from aerial photographs. Each sheet is numbered to correspond with numbers shown on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbol. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information in the survey. This guide lists all of the soils of the county in alphabetic order by map symbol. It shows the page where each kind of soil is described, and also the page for the capability unit, woodland group, or any other group in which the soil has been placed.

Individual colored maps showing the relative suitability or limitations of soils for many specific purposes can be developed by using the soil map and information in the text. Interpretations not included in the text can be developed by grouping the soils according to their suitability or limitations for a particular use. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about the use and management of soils from the soil descriptions and from the section that discusses management of soils for crops and pasture.

Foresters and others can refer to the section "Use of Soils for Woodland," where the soils of the county are grouped according to their suitability for trees.

Game managers, sportsmen, and others concerned with wildlife will find information about soils and wildlife in the section "Wildlife."

Community planners and others concerned with community development can read about the soil properties that affect the choice of homesites, industrial sites, schools, and parks in the section "Nonfarm Uses of Soils."

Engineers and builders will find under "Engineering Applications" tables that give engineering descriptions of the soils in the county and that name soil features that affect engineering practices and structures.

Scientists and others can read about how the soils were formed and how they are classified in the section "Genesis, Morphology, and Classification of Soils."

Newcomers in Schoharie County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "General Nature of the County," which gives additional information.

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SOIL SURVEY OF SCHOHARIE COUNTY, NEW YORK

BY DONALD F. FLORA, J. A. FERWERDA, K. T. ACKERSON, J. B. BARTLETT, AND E. CROCKER, SOIL CONSERVATION SERVICE, AND F. R. TROEH, J. C. DIJKERMAN, A. R. SOUTHARD, AND C. F. CASSADY, CORNELL UNIVERSITY AGRICULTURAL EXPERIMENT STATION

UNITED STATES DEPARTMENT OF AGRICULTURE IN COOPERATION WITH CORNELL UNIVERSITY AGRICULTURAL EXPERIMENT STATION

SCHOHARIE COUNTY is in the east-central part of New York (fig. 1). It occupies approximately 400,000 acres, or 625 square miles. The county seat, Schoharie, has a population of 1,168. It is about 30 miles, by highway, from Albany, the State capital, and about 135 miles north of the city of New York. Schoharie Creek flows northward through the county, near the central part, and into the Mohawk River in Montgomery County.

The principal farm enterprise in the county is dairy farming. Most of the milk produced is sold in New York City as fluid milk. The main crops grown are those that support dairy farming. These crops include corn for both grain and silage, oats, hay, and pasture. A few vegetables are grown in the valley of Schoharie Creek, and a small acreage in the southern part of the county is used to grow cauliflower. Most of these vegetables are processed in nearby Canajoharie.

According to estimates, about 47 percent of the county is woodland. Most of this acreage is in woodlots on farms, but a small acreage is State owned. The sale of wood products helps to supplement the income of farmers, and wooded areas contribute a great deal to the esthetic and scenic values and to recreational facilities of the county.

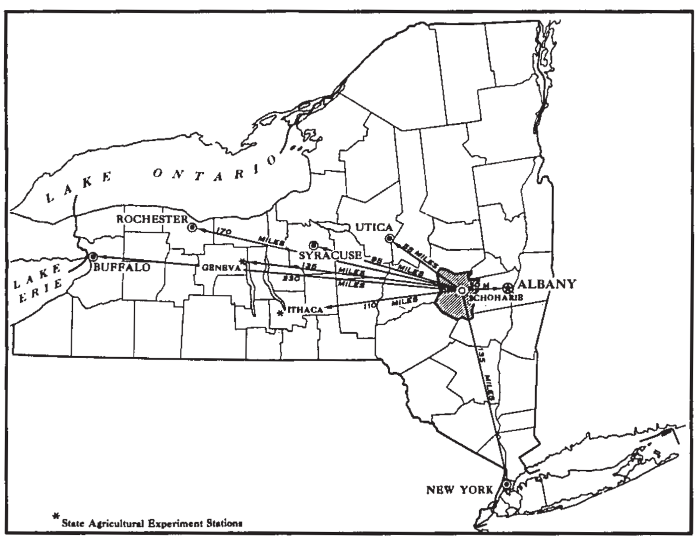

Figure 1.—**Location of Schoharie County in New York.**

Howe Caverns, one of the better known natural attractions for tourists in the northeastern part of the country, is in Schoharie County.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in Schoharie County, where they are located, and how they can be used.

They went into the county knowing they likely would find many soils they had already seen, and perhaps some they had not. As they traveled over the county, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by roots of plants.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. For successful use of this survey, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Darien and Lordstown, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that go with their behavior in the natural landscape. Soils of one series can differ somewhat in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man.

Many soil series contain soils that differ in texture of their surface layer. According to such differences in texture, separations called soil types are made. Within a series, all the soils having a surface layer of the same

texture belong to one soil type. Darien silt loam and Darien silty clay loam are two soil types in the Darien series. The difference in texture of their surface layers is apparent from their names.

Some types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into phases. The name of a soil phase indicates a feature that affects management. For example, Darien silt loam, 2 to 8 percent slopes, is one of several phases of Darien silt loam, a soil type that ranges from gently sloping to moderately steep.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that greatly help in drawing soil boundaries accurately. The soil map in the back of this survey was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly equivalent to a soil type or a phase of a soil type. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil type or soil phase.

In preparing some detailed maps, the soil scientists have a problem of delineating areas where different kinds of soils are so intricately mixed, and so small in size that it is not practical to show them separately on the map. Therefore, they show this mixture of soils as one mapping unit and call it a soil complex. Ordinarily, a soil complex is named for the major kinds of soil in it, for example, Honeoye-Farmington complex. Most surveys include areas where the soil material is so rocky, so shallow, or so frequently worked by wind and water that it cannot be classified by soil series. These areas are shown on the map like other mapping units, but are given descriptive names, such as Alluvial land or Muck and Peat, and are called land types. The soil scientist may also show as one mapping unit two or more soils or land types if the differences between them are so small that they do not justify separation for the purpose of the survey. Such a mapping unit is called an undifferentiated soil group; for example, Fredon and Halsey gravelly loams.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soils in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soils. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in a way that it is readily useful to different groups of readers, among them farmers, ranchers, managers of woodland, engineers, and homeowners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in the soil surveys. The soil scientists set up trial groups, on the basis of yield and practice tables and other data, and then test these groups by further study and by consultation with farmers, agronomists, engineers, and others. Then, the scientists adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the ten soil associations in Schoharie County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of farming or other land use. Such a map is not suitable for planning the management of a farm or field, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect management.

The ten soil associations in Schoharie County are described in the following pages.

1. Barbour-Basher-Middlebury Association

Deep, nearly level, mainly well drained and moderately well drained soils of the bottom lands

This association consists mainly of well drained and moderately well drained soils, though the Basher soils are somewhat poorly drained in places. The soils of this association are medium textured and medium acid to slightly acid. They occur chiefly in broad flats along Schoharie Creek (fig. 2), but small areas are along Cobleskill Creek between Cobleskill and Richmondville. Some areas are flooded annually, but other areas are flooded only once in 25 to 50 years. This association occupies about 3 percent of the county.

The Barbour soils make up about 55 percent of this association; the Basher and Middlebury, about 25 percent; and minor soils, the remaining 20 percent.

The Barbour soils dominate in the valley of Schoharie Creek. They are deep, well drained, and medium textured. Middlebury soils dominate in the valley of Cobleskill Creek. They are deep, moderately well drained, and medium textured. The Basher soils are deep, moderately well drained to somewhat poorly drained, and medium textured.

Of the minor soils, the Tioga, Wayland, Holly, Papakating, and Alluvial land are alluvial soils. They make up about 15 percent of this association. Small areas of the gravelly Tunkhannock and Chenango and the clayey Odessa and Rhinebeck soils are on terraces and fans. These minor soils make up about 5 percent. Drainage of the minor soils ranges from good to very poor.

Figure 2.—**In the foreground are nearly level soils of the Barbour-Basher-Middlebury soil association. The wooded area in the background is Vromans Nose. It is in the Lordstown-Mardin soil association.**

The soils in this association are among the better soils for farming in the county. They produce the small grains, corn, and hay to support dairy farming, and they are also used extensively for vegetables. The main vegetables grown are sweet corn, peas, beets, and carrots. Field corn grows exceptionally well on the Barbour soils. Crops on these soils respond well to additions of lime, fertilizer, and manure. Poorly drained and very poorly drained soils, mainly the Holly, Wayland, and Papakating, generally are used as pasture or woodland. The main limitation to the use of soils in this association for crops is flooding, but flooding seldom occurs during the growing season. Flooding is also the main limitation to nonfarm use.

2. Burdett-Erie-Nunda-Langford Association

Deep, gently sloping to moderately steep, mainly somewhat poorly drained and moderately well drained, medium-lime and low-lime soils of the uplands

This association consists mainly of somewhat poorly drained and moderately well drained soils. These are channery soils on till plains and drumlike hills. Seeps occur on some hillsides, and some areas are very stony. This association is made up of two areas along the northeastern boundary of the county—a large area west and a small area east of Schoharie Creek. The elevation ranges from 1,100 to 1,300 feet above sea level. In most places sandstone, shale, or limestone bedrock is at a depth of 10 to 20 feet. This association occupies about 5 percent of the county.

In Schoharie County the Burdett and Erie soils are closely intermingled, and together they make up about 50 percent of the association. The Langford and Nunda soils are also closely intermingled, and together they make up about 25 percent of the association. The remaining 25 percent consists of minor soils.

The Burdett and Erie soils are gently sloping to undulating. These soils are deep, somewhat poorly drained channery silt loams. The Nunda and Langford soils are gently sloping to moderately steep. They are deep, mainly moderately well drained channery silt loams. In the Erie soils, a dense fragipan is at a depth of about 12 inches; in the Langford soils the fragipan is at a depth of about 20 inches. When dry, this pan is hard and brittle and is nearly impenetrable to water and roots. The Burdett soils are similar to the Erie soils, and the Nunda are similar to the Langford soils. The Burdett and Nunda soils have a dense, moderately fine textured layer at approximately

the same depth as the fragipans in the Erie and Langford soils.

The minor soils are the Darien, Tuller, Ilion, Lyons, Madalin, and Muck. These soils are mainly medium textured, but some are stony. Drainage of the minor soils ranges from somewhat poor to very poor.

The main farm enterprise in this association is dairy farming. Corn, oats, and an alfalfa-grass mixture for hay are commonly grown, and birdsfoot trefoil is grown extensively for both hay and pasture. Growth of these crops is moderately good, but fairly large amounts of lime and fertilizer are needed. Planting is often delayed because these soils stay wet and cold late in spring, and crops are often injured by drought in summer. Areas that are too wet for cultivated crops or too stony for cultivation are used for pasture or as woodland. Most areas of woodland are in native hardwoods that have little value.

The disposal of sewage effluent from septic tanks is severely limited by restricted drainage and a perched water table.

3. Darien-Nunda Association

Deep, nearly level to moderately steep, somewhat poorly drained to well-drained, medium-lime soils of the uplands

This association consists mainly of somewhat poorly drained and moderately well drained to well drained soils that have a moderately fine textured subsoil and overlie calcareous glacial till. These soils occur on drumlinlike hills and ground moraines in the northern part of the county. These hills are long and narrow, are about 50 to 100 feet high, and extend in an east-west direction. In many places the top of these hills is nearly level, about 100 feet wide, and more than half a mile long. Near Hyndsville and Seward these soils are in broader areas and are less hilly. This association occupies about 7 percent of the county.

The Darien soils make up about 50 percent of this association; the Nunda soils, about 30 percent; and minor soils, the remaining 20 percent.

The Darien soils are in the flatter areas between the hills and on hilltops. They are deep, medium-lime soils that are moderately fine textured, and mostly somewhat poorly drained. The better drained Nunda soils are on the sides and convex tops of hills. They are deep medium-to low-lime soils that are medium textured, and mostly moderately well drained.

The minor soils are the Ilion, Lyons, Madalin, Tuller, Allis, and Muck and Peat. These soils are mainly medium textured, but some are highly organic and some are stony. Drainage of the minor soils is poor or very poor.

Except for the very wet areas, most soils of this association are used for dairy farming. The common crops grown are corn and oats and such mixtures as alfalfa and grass for hay, clover and grass for pasture, and birdsfoot trefoil and grass for both hay and pasture. Growth of crops is fair to good if small to moderate amounts of lime and adequate amounts of fertilizer are added and if other management is good. The choice of crops is somewhat limited by wetness, which also delays tillage and planting in spring. Areas that are too wet for cultivated crops are used mainly for pasture or as woodland.

Wetness and the slowly permeable layers in the subsoil interfere with the disposal of septic tank effluent.

4. Honeoye-Farmington Association

Deep and shallow, nearly level to steep, well-drained to excessively drained, high-lime soils of the uplands

This association consists of well-drained to excessively drained soils that, in most places, are less than 5 feet deep to limestone bedrock. This association occurs in four irregularly shaped areas near the northern county line. Much of the area is gently sloping, but it is broken in places by short steep slopes that resemble "stairsteps." In many places the northern border of this association is marked by an escarpment consisting mainly of the Manlius and Coeymans limestones. The Manlius and Coeymans limestones consist of nearly flat-lying beds that are about 100 feet thick. Sinkholes, caves, and cracks in the bedrock are common, and much of the surface water drains underground through these openings. The Howe and Secret Caverns formed in these limestones. Streams on the surface are few and short. This association occupies about 4 percent of the county.

The Honeoye soils make up about 40 percent of this association; the Farmington soils, about 40 percent; and minor soils, the remaining 20 percent.

The Honeoye soils are fairly deep, well drained, and medium textured. The Farmington soils are shallow to limestone, well drained to excessively drained, and medium textured. Some areas are very rocky. The Honeoye soils in this association formed in highly calcareous glacial till that is generally less than 5 feet thick over limestone; the Farmington, in glacial till less than 20 inches thick over limestone.

The minor soils are the Lyons, Ilion, Darien, Appleton, Lima, and Muck and Peat. These soils are mainly medium textured, but some are highly organic. Drainage of these soils ranges from somewhat poor to very poor.

Most of the acreage in this association is used for corn, oats, and hay in support of dairy farming. An afalfa-grass mixture is grown for hay, and a birdsfoot trefoil-grass or clover-grass mixture is grown for hay or pasture. For these crops and pasture, lime needs are slight to medium on most of these soils, and the supply of available potassium is moderate. Areas that are too wet or too shallow for cultivated crops are used for pasture or as woodland.

In places the limestone bedrock is mined and used for making cement and as agricultural lime.

5. Lansing-Appleton Association

Deep, gently sloping to moderately steep, well-drained to somewhat poorly drained, medium-lime soils of the uplands

This association consists of well-drained to somewhat poorly drained soils on smooth rounded hills that are separated by small narrow drainageways. Most of this association is in Wright Township in the northeastern part of the county. The slopes are mainly long, smooth, and gentle to moderately steep, but in places they are steep. This association occupies about 3 percent of the county.

The Lansing soils dominate in this association and make

up about 40 percent; the Appleton soils, about 15 percent; and minor soils, the remaining 45 percent.

The Lansing are deep, well-drained, medium-textured soils that developed in moderately calcareous glacial till and contain many limestone and sandstone fragments. The Appleton are somewhat poorly drained, medium-textured soils that formed in similar materials and that occur in seepy areas on hillsides and on the lower part of long slopes.

The minor soils are the Lyons, Ilion, Nassau, Farmington, and Darien. The Lyons and Ilion soils are in small depressions between hills and in wetter areas or seeps on hillsides. The minor soils are mainly medium textured, but some are very rocky. Drainage of the minor soils ranges from excessive to very poor.

This association contains some of the better soils that developed in glacial till in Schoharie County. Because much of the acreage is sloping, these soils are not well suited to truck crops. They are better suited to dairy farming, which is the main farm enterprise. Alfalfa, birdsfoot trefoil, timothy, red clover, corn, and oats are the main crops.

Crops grow well on these soils if they are limed, fertilized, and managed well. Where these soils are unlimed, the surface layer is acid, but free lime occurs in the substratum. Areas that are too wet, too stony, or too steep for cultivated crops are used as unimproved pasture or woodland.

6. Lordstown-Mardin Association

Yellowish-brown, moderately deep and deep, nearly level to steep, well drained to moderately well drained, strongly acid soils of the uplands

This is the most extensive soil association in the county. It consists mainly of well drained and moderately well drained soils that are nearly level to steep. A typical landscape consists of a series of flat-topped ridges cut by shallow drainageways and a network of small streams that have steep side slopes. The elevation of these ridges is 1,700 feet or more above sea level.

The soils in this association are mostly moderately deep to bedrock, or they are deep and have a fragipan. The bedrock dips slightly toward the south, and in some places the slopes resemble "stairsteps." The growing season for soils in these higher positions is shorter than that for soils in lower positions in the uplands and for soils in the larger valleys. This association occupies about 46 percent of the county.

The Lordstown soils make up about 50 percent of this association: the Mardin, about 20 percent; and minor soils, the remaining 30 percent.

The Lordstown soils are moderately deep, well drained, and medium textured. Much of the acreage is very stony and occupies steep hillsides. The Mardin are deep, moderately well drained, medium-textured soils that are rolling or have long, smooth, gentle to steep slopes. Very stony areas are common. The Mardin soils have a very dense, slowly permeable fragipan at a depth of about 22 inches.

The minor soils are the Volusia, Arnot, Chippewa, Tuller, and Allis soils in the uplands and the Middlebury, Tunkhannock, and Chenango soils in the valleys. The Volusia soils are mainly on the lower parts of hillsides, and the shallow Arnot soils are on the ridgetops. The other minor soils are in various positions in the association. The minor soils are mainly medium textured, and many are very stony. Drainage of the minor soils ranges from good to poor.

Much of the acreage in this association is too steep or too stony or flaggy for cultivation. Many of the steeper areas were never cleared and are still in trees. Also, many areas are shallow to bedrock, have low water-holding capacity, and are droughty, and other areas are wet. Some of the better areas of these soils are used for dairy farming. For good growth of crops, large additions of lime and fertilizer are needed. In the last few years, however, many of the farms have been sold for summer homes, campsites, and other nonfarm uses. Because these soils have many limitations, they are not so suitable for farming as the soils in some other associations of the county. Many areas that originally were farmed are now idle or have been planted to trees as a result of the State Reforestation Program.

7. Nassau Association

Shallow, nearly level to steep, well-drained, strongly acid, shaly soils of the uplands

This association consists of well-drained, nearly level to steep soils that generally overlie acid gray shale in which there is some interbedded sandstone. Two small areas are in the northwestern part of the county along the county line, and one is in the northeastern part.

This association is a series of flat-topped, bedrock-controlled hills that have steep side slopes. The soils are shallow to shale bedrock, and in many places shale crops out on the hillsides. This association occupies about 1 percent of the county.

The Nassau soils make up about 70 percent of this association and minor soils the remaining 30 percent.

The Nassau soils are shallow, well drained, and medium textured. They formed in glacial till 10 to 20 inches thick over shale bedrock, and the profile contains many fragments of shale. These soils occur on both hillsides and hilltops.

The minor soils are the Tuller, Allis, Mohawk, Appleton, Ilion, Lyons, Mardin, Volusia, and Chippewa. The Tuller and Allis soils occur in all three areas of this association, mainly in depressions on the hilltops, and make up about 15 percent; the Mohawk, Appleton, Ilion, and Lyons soils occur only in the two northwestern areas and make up about 15 percent of those areas. These soils occur at lower elevations in the landscape. The Mardin, Volusia, and Chippewa soils, which also occur at lower elevations only in the northeastern area, make up about 15 percent of that area. These minor soils are mainly medium textured, but some are stony. Drainage of these soils ranges from good to poor.

Some areas of this association are used for dairy farming, but much of the acreage is idle or is woodland. The use of soils in this association for crops, woodland, and nonfarm purposes is seriously limited by shallowness to bedrock.

Shale is commonly mined and used for surfacing roads.

8. Mohawk-Honeoye Association

Deep, gently sloping to steep, well drained and moderately well drained, high-lime soils of the uplands

This association consists of well drained and moderately well drained, gently sloping to steep, high-lime soils mainly on drumlinlike hills. These smooth rounded hills range mainly from 100 to 300 feet in height above the small nearby drainageways and from 1,200 to 1,500 feet above sea level. In most places they are about one-fourth mile wide, and their longer axis generally extends in an east-west direction. This association occupies about 10 percent of the county.

In Schoharie County the Mohawk and Honeoye soils are closely intermingled, and together they make up about 70 percent of the association. The remaining 30 percent consists of minor soils.

The Mohawk soils are deep, well drained to moderately well drained, and medium textured. They formed in calcareous glacial till derived mainly from black shale. The Honeoye soils are deep, well drained, and medium textured. They formed in highly calcareous glacial till derived mainly from limestone.

Of the minor soils, the Darien makes up about 10 percent and the Lima, Appleton, Lyons, and Ilion about 20 percent. The minor soils are mainly medium textured, but some are stony. Drainage of the minor soils ranges from moderately good to very poor.

The soils in this association are among the better soils formed in glacial till in the county. Because slopes range from gentle to steep, these soils are better suited to dairy farming than to truck crops or other special crops. Corn, oats, and an alfalfa-grass mixture for hay are the crops commonly grown. Areas that are too steep, too stony, or too wet for cultivation are used for woodland or unimproved pasture.

9. Oquaga-Culvers-Morris Association

Reddish, moderately deep and deep, nearly level to steep, well-drained to somewhat poorly drained, strongly acid soils of the uplands

This association consists of well-drained to somewhat poorly drained, nearly level to steep soils in two fairly large areas in the southern part of the county. A typical landscape consists of steep hillsides and a series of flat-topped ridges and benches more than 2,000 feet above sea level. The hillsides and benches are cut by steep valleys. The growing season for soils in these high positions is shorter than that for soils in lower positions in the uplands. This extensive association occupies about 18 percent of the county.

The Oquaga soils make up about 45 percent of this association; the Culvers soils, about 25 percent; the Morris soils, about 25 percent; and minor soils, the remaining 5 percent.

The Oquaga soils are moderately deep, well drained, medium textured, and stony. They occur on nearly level ridgetops and steep hillsides. The Culvers soils are deep but have a fragipan that impedes drainage at a depth of 16 to 24 inches. They are moderately well drained, medium textured, and stony. They formed on hillsides in glacial till derived mainly from red sandstone, siltstone, and some red shale. The Morris soils are similar to the Culvers soils but have a fragipan at a depth of 12 to 18 inches. They are somewhat poorly drained, medium textured, and stony. These soils formed on the lower part of hillsides in glacial till derived mainly from red sandstone, siltstone, and some red shale.

The minor soils are the Arnot, Cattaraugus, and Norwich. They are medium textured, and some are stony. Drainage of the minor soils ranges from good to poor.

Most steep areas of this association have never been cleared for cultivation, and many areas that were cleared and farmed are now idle or have been planted to trees. Some areas of the deeper, better soils are used for dairy farming, and some areas are used for summer homes, recreation, or other nonfarm purposes. Some soils in this association have low water-holding capacity and are droughty; others are too wet; and some are too steep, too stony, or too flaggy for cultivation. The growing season at this elevation is fairly short. For good growth of crops, large additions of lime and fertilizer are needed. Because of these limitations, these soils are less desirable for most farm enterprises than soils in lower positions.

10. Schoharie Association

Deep, nearly level to steep, mainly moderately well drained to well drained soils in old lakebeds

This association consists mainly of moderately well drained to well drained, nearly level to strongly sloping or steep soils on dissected glacial lake deposits along the valley of Schoharie Creek. The lake deposits in which these soils formed are reddish, calcareous clay and silt. This association occupies about 3 percent of the county.

The Schoharie soils make up about 60 percent of this association, and minor soils make up about 40 percent.

Schoharie soils are deep, moderately well drained to well drained, and moderately fine textured and medium textured. They have a clayey subsoil. These soils occupy some of the more sloping and broken areas of this association.

Of the minor soils, 10 percent is somewhat poorly drained Odessa, and 10 percent is poorly drained and very poorly drained Lakemont. These soils formed in the same kind of lake deposits as the Schoharie soils. The Odessa soils occupy the more gentle slopes, and the Lakemont soils occupy slight depressions. The remaining 20 percent consists of soils formed in glacial till and glacial outwash. These soils occur as gravelly fans, deltas, and small islands of till on or within the old lakebed. The soils that formed in till are mainly the Burdett, Erie, Honeoye, and Lordstown; those that formed in outwash are the Tunkhannock, Chenango, and nearby soils.

The soils of this association are used mainly for dairy farming. The less sloping and better drained areas are used for hay and pasture, the steeper areas for pasture or as woodland, and the poorly drained and very poorly drained areas as woodland or unimproved pasture. These soils are not well suited to cultivated crops, but they are near some of the better soils for farming in the county. They are therefore used in many places along with the better soils of the adjacent bottom lands to produce the hay and pasture needed to support dairy farming. A mixture of alfalfa and grass, trefoil and grass, or red clover and timothy is commonly grown for hay or pasture.

The soils of this association are among the most erodible in the county, and careful management is needed. They can be worked only in a narrow range of moisture content. They are generally too wet to work early in spring and too dry and hard to work late in summer and early in fall. These soils are medium acid or slightly acid. The supply of available potassium is very high, and the supply of available phosphorus is low. Additions of lime and fertilizer are needed for good growth of most common crops.

The use of these soils for homesites and similar nonfarm purposes is limited by slow permeability and a high hazard of erosion.

Use and Management of the Soils

The first part of this section discusses the use of soils for crops and pasture. In the second part, the capability classification system used by the Soil Conservation Service is explained, the capability units used in Schoharie County are briefly described, and some suggestions for management are given. In the third part, a table lists estimated yields per acre for each soil under two levels of management. Following that part are discussions of the use of soils as woodland, for wildlife, and in engineering works. Finally, information about the use of soils for nonfarm purposes is given.

Use of Soils for Crops and Pasture[1]

This subsection explains characteristics of soils that affect their suitability for crops and pasture. It is designed to help farmers, those who advise farmers, and students to choose soil and crop management practices that are suitable for wise and economic use of the soils on a farm and that are appropriate for the conditions prevailing at the time the choices are made. Before making his choices, the user of this soil survey should consider the latest information on soil and crop management.[2]

Subsoil characteristics affecting root growth

In choosing a crop to be grown on a given soil, the characteristics of the subsoil or underlying material need to be considered. These characteristics are given for each soil in the section "Descriptions of the Soils."

In some soils, such as the Barbour and Tunkhannock, the subsoil is loose and easily penetrated to a great depth by roots. In other soils, such as the well-drained Mohawk and Honeoye, dense glacial till is at a depth of 24 inches and restricts root penetration. In the Mardin, Langford, Culvers, Volusia, and Morris soils a fragipan at a depth of about 10 to 24 inches restricts drainage and root penetration. The Arnot and Tuller soils are underlain by bedrock at a depth of 20 inches or less.

In areas where the movement of air and water is restricted by a claypan, fragipan, or other dense material, the growth of roots is also restricted.

Only those crops that have a root system suited to the thickness and drainage of the root zone of a soil should be grown on that soil. Figure 3 shows typical root zones for well drained, moderately well drained, somewhat poorly drained, and poorly drained soils.

Acidity relationships of the soils

The natural lime content of the soils in Schoharie County is rated *high*, *medium*, *low*, or *very low*. Figure 4 illustrates the relationship of the different lime levels (pH values) to a depth of 60 inches in four soil profiles. Also the content of lime can be related to the soil associations as shown on the general soil map at the back of this survey.

High-lime soils dominate in the Mohawk-Honeoye and Honeoye-Farmington soil associations. The high-lime soils are neutral or slightly acid in the upper part of their profile and become less acid with increasing depth. These soils generally have free lime at a depth of 16 to 36 inches.

Medium-lime soils dominate in the Darien-Nunda, Lansing-Appleton, and Schoharie associations. Medium-lime soils are medium acid to strongly acid to a depth of 12 to 24 inches and become less acid with increasing depth. Free lime generally is below a depth of 36 to 48 inches.

Low-lime soils dominate in the Burdett-Erie-Nunda-Langford association. Low-lime soils are medium acid to strongly acid to a depth of 24 inches or more, are slightly acid below that depth, and have free lime deep in their substratum. Both low-lime and medium-lime soils are in the Barbour-Basher-Middlebury association.

Very low lime soils dominate in the Nassau, Lordstown-Mardin, and Oquaga-Culvers-Morris associations. Very low lime soils are very strongly acid to a depth of 24 inches or more. These soils are neutral in the substratum in places but generally below the depth reached by roots.

Lime moves downward at an average rate of about one-half inch per year in a soil having a silt loam surface layer, which is the most common texture in the county. A fairly large amount of lime is also removed from the soils by crops each year. Therefore, lime is needed periodically, usually once in a rotation sequence, to maintain the desired pH value in the plow layer of the very low lime, low-lime, and medium-lime soils and, in some places, the high-lime soils.

Nitrogen relationships of the soils

In most soils of the county, the plow layer is 3 to 6 percent organic matter. Nitrogen is released from this organic matter at a rate of 40 to 120 pounds per acre per year. On soils that are managed well, the need for applying supplemental nitrogen is greatest during cool periods in spring.

Phosphorus relationships of the soils

In Schoharie County most soils are medium textured, and their ability to supply phosphorus is naturally low. The medium-textured soils supply, per acre, the equivalent

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[1] This subsection was prepared by REESHON FEUER, associate professor of agronomy, Cornell University, and by E. L. MCPHERRON, conservation agronomist, Soil Conservation Service. Unless otherwise noted, the material is based on the results of research studies performed on the Aurora and Mount Pleasant Research Farms by staff members and associates of the New York State College of Agriculture at Cornell University.

[2] New research findings are reported currently in annually revised editions of "Cornell Recommends for Field Crops" and "Cornell Recommends for Vegetable Crops," both prepared by the staff of the New York State College of Agriculture at Cornell University. Cornell Miscellaneous Bulletin Number 47 and current editions of other applicable publications on soil and crop management should also be consulted. A great body of constantly revised but unpublished information is available upon request from the local office of the Cooperative Extension Service and of the Soil Conservation Service.

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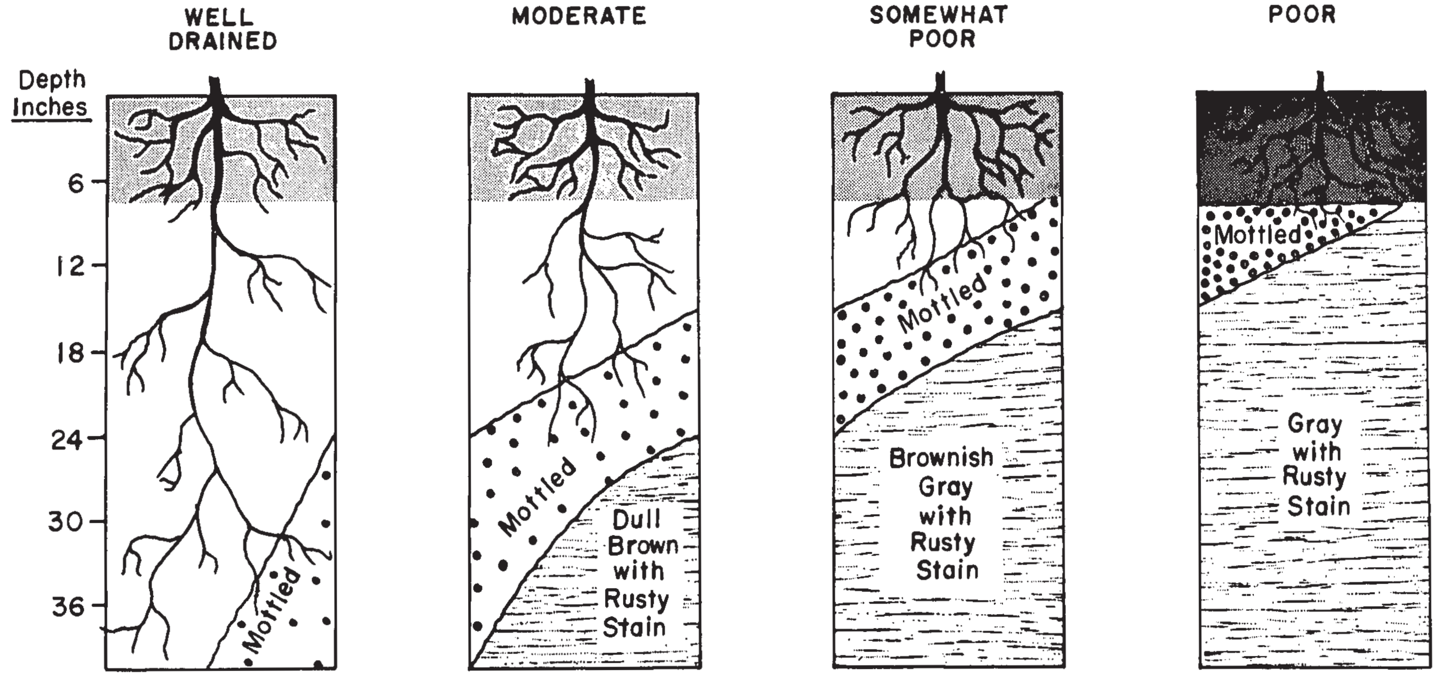

Figure 3.—**Effect of soil drainage on root growth.**

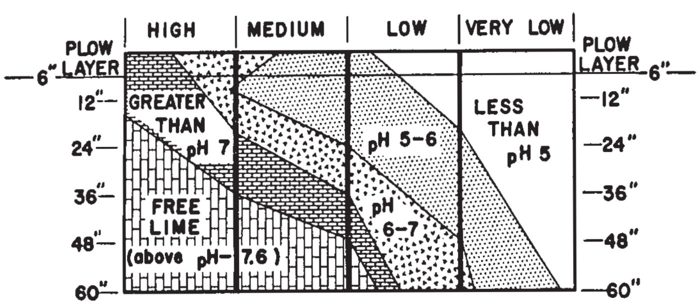

Figure 4.—**Diagram showing typical distribution of lime in soils having, respectively, *high, medium, low,* and *very low* content of lime.**

of about 10 pounds of phosphate annually, but the moderately fine textured soils supply the equivalent of about 20 pounds. The addition of adequate amounts of phosphate fertilizer is therefore essential for good growth of crops.

Potassium relationships of the soils

The soils of this county generally have a moderate to high total reserve of potassium, most of which is held in the clay particles, mainly of illite or vermiculite. In the section "Descriptions of the Soils" the soils in each series are rated for the supply of available potassium. These ratings are *high* and *moderate.*

Soils that have blocky structure and a large accumulation of clay in their subsoil generally release, or change potassium into a chemical form usable by crops, the equivalent of about 120 pounds of potash annually per acre. This amount of potash will produce about 3 tons of a grass-legume hay if other soil conditions are satisfactory. The Schoharie and Hudson soils release this amount and are rated high. Medium-textured soils that have some accumulation of clay in their subsoil, such as the Honeoye, Mohawk, and Lansing, can supply, per acre, the equivalent of 70 to 80 pounds of potash annually to deep-rooted legumes, or enough to produce 2 tons of hay. These soils are rated moderate to high. All the medium-textured acid soils, such as the Lordstown, Mardin, and Culvers, can supply, per acre, the equivalent of about 50 pounds of potash annually, or enough to produce about 1.25 tons of a legumegrass hay. These soils are rated moderate.

Capability Groups of Soils[3]

Capability classification is the grouping of soils to show, in a general way, their suitability for most kinds of farming. It is a practical classification based on the limitations of the soils, the risk of damage when they are used for the ordinary field crops or sown pastures, and the way they respond to treatment. The classification does not apply to most horticultural crops, or to rice and other crops that have special requirements for production. The soils are classified according to degree and kind of limitations, but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soils; and without consideration of possible major reclamation.

In the capability system, all soils are grouped at three levels, the capability class, the subclass, and the unit. These are discussed in the following paragraphs.

CAPABILITY CLASSES, the broadest groupings, are designated by Roman numerals I through VIII. The larger the numerals, the greater the limitations and the narrower the choices for practical use. The classes are defined as follows:

Class I. Soils have few limitations that restrict their use.

[3] This subsection was prepared by DONALD F. FLORA, soil scientist, and E. L. MCPHERRON, conservation agronomist, Soil Conservation Service.

Class II. Soils have some limitations that reduce the choice of plants or require moderate conservation practices.
Class III. Soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.
Class IV. Soils have very severe limitations that restrict the choice of plants, require very careful management, or both.
Class V. Soils subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife food and cover.
Class VI. Soils that have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover.
Class VII. Soils that have very severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife.
Class VIII. Soils and landforms that have limitations that preclude their use for commercial plant production without major reclamation and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes. (None mapped in Schoharie County.)

Capability Subclasses are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c* is used in those areas where climate is the chief limitation to the production of common cultivated crops.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only subclasses indicated by *w*, *s*, and *c*, because the soils in it are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

Capability Units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-1 or IIIe-2. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation, and the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph. The Arabic numeral specifically identifies the capability unit within each subclass.

Management by capability units

In the following pages, the capability units in Schoharie County are described and suggestions for use and management of the soils are given. The mention of the soil series in a description of a unit does not mean that all the soils in the series are in the unit. The names of all the soils in any capability unit can be found by referring to the "Guide to Mapping Units" at the back of the survey.

Some of the terms used in this subsection may need explanation. The term *diversions* refers to terraces that are used to break long slopes or to convey water that runs onto these soils from adjacent slopes. The spacing between diversions that are used to break long slopes largely depends on the kinds of soils, the cropping sequence, and the supporting practices used. In some places closely spaced diversions, locally called *drainage diversions*, are used to break long slopes and also to drain the soil into which they are constructed. *Graded rows* are used in areas of row crops. The crop rows are on a grade that is gradual enough for disposal of excess water without damaging the soil. *Graded tillage* refers to areas in which close-growing crops are grown, not on the contour, but at a grade that is gradual enough for disposal of water without damaging the soil. A *close-growing* crop is wheat, oats, or other small grain. *Sod-forming crops*, or sod crops, are hay and pasture.

CAPABILITY UNIT I-1

This unit consists of deep, well-drained, medium-texture gravelly soils on glacial outwash terraces and fans. These soils are nearly level to gently sloping.

The soils in this unit are in the Howard, Tunkhannock, and Chenango series. They are strongly acid to medium acid in their subsoil. A gravelly and sandy substratum occurs at a depth of 2 or 3 feet and is very rapidly permeable. Free lime occurs in the Howard soils at a depth of 3 to 5 feet; in the Tunkhannock and Chenango soils free lime is below a depth of 4 feet. The capacity of these soils to hold moisture is moderate, and their ability to supply plant nutrients is medium to low. The soils in this unit are easy to till, and crops on them respond well if management is good.

The soils in this unit are suited to all crops grown in the county, especially the deep-rooted crops. These soils generally are more valuable for crops in rotation than for permanent pasture, but they are well suited to grazing early in spring. Desirable practices for row cropped areas are the use of cover crops, minimum tillage, and contour farming where slopes are more than 3 percent. Irrigation may be needed if shallow-rooted crops are grown.

CAPABILITY UNIT I-2

This capability unit consists of deep, well-drained, moderately coarse textured and medium-textured soils on level or nearly level flood plains.

The soils in this unit are in the Barbour and Tioga series. The Barbour soils formed in reddish alluvial sediments, and the Tioga soils formed in olive-brown alluvial sediments. These soils are strongly acid to medium acid in areas south of Middleburg along Schoharie Creek and its tributaries, but they are slightly acid to neutral in areas north of Middleburg along Schoharie, Fox, and Cobleskill Creeks. They have good available moisture capacity and good ability to retain plant nutrients. These soils are easy to till, and crops on them respond well if management is good.

These soils are among the most productive in the county. They generally are more valuable for crops than for pasture. They are suited to all crops grown in the county and are especially well suited to vegetables. Practices needed in row cropped areas are use of crop residue, a winter cover crop, minimum tillage, and additions of lime and fertilizer. Careful management of forage crops is also needed. Although crops on these soils are seldom damaged by flooding, protecting the streambanks, improving stream channels, and constructing dikes to prevent overflow are desirable in some places.

CAPABILITY UNIT IIe-1

This unit consists of well-drained, medium-textured soils in the uplands. These soils formed mainly in calcareous glacial till. Slopes range from 2 to 10 percent.

The soils of this unit are in the Lansing, Honeoye, and Farmington series. The Honeoye and Lansing soils are deep and the Farmington soils are shallow to limestone bedrock. The surface layer of Honeoye soils ranges from slightly acid to neutral, and that of Farmington soils ranges from medium acid to strongly acid. The surface layer of Lansing soils is strongly acid. Free lime occurs between a depth of 24 and 36 inches in the Honeoye and Farmington soils and between 36 and 50 inches in the Lansing soils.

The soils in this unit are good for farming. They are easy to work, and crops on them respond well if management is good. Except where they are shallow to bedrock, these soils have good available moisture capacity. Their ability to supply plant nutrients is medium to high. Because slopes are as much as 10 percent in places, practices that conserve moisture and control runoff and erosion are needed where these soils are cropped intensively.

The soils in this unit are suited to all crops grown in the county. They can also be used for pasture or as woodland. Where they are in pasture, they can be grazed early in spring. Desirable practices for row cropped areas are contour farming, minimum tillage, and on long slopes, contour stripcropping. Diversion terraces are needed in places.

CAPABILITY UNIT IIe-2

Barbour and Tioga gravelly loams, fans, 0 to 8 percent slopes, are the only soils in this capability unit. These well-drained, acid soils occupy alluvial fans at the mouth of swift streams. The Barbour soil formed in red sediments, and the Tioga soil formed in olive-brown sediments.

These soils are easily tilled, and crops on them respond well if management is good. The ability of the soils to supply plant nutrients is moderate, and their capacity for holding moisture is fair to good, depending on the content of gravel. Flooding is a hazard, and locally, streambanks are likely to erode. Where slopes are more than 3 percent, these soils are susceptible to slight erosion and practices that control runoff and erosion and conserve moisture are desirable.

The soils in this unit can be used for crops and pasture and as woodland. These soils are suited to most crops grown in the county. The most common crops are corn grown for silage and grain, oats, and forage crops consisting of a mixture of grasses and legumes. Deep-rooted legumes are preferred. Where these soils are used for pasture, they can be grazed early in spring. Desirable practices for row cropped areas are adding lime and fertilizer and using a cover crop after a row crop. Where hay and pasture are grown for only a short time, minimum tillage and good management of crop residue are essential. Other desirable practices are contour farming and, where slopes are more than 6 percent, contour stripcropping. Dikes to prevent overflow of streams and practices that protect streambanks and improve channels are needed in some places.

CAPABILITY UNIT IIe-3

Lordstown silt loam, 0 to 8 percent slopes, is the only soil in this unit. This well-drained, strongly acid soil is 20 to 40 inches deep to shale bedrock.

This soil is easy to till, and its ability to supply plant nutrients is moderate. The content of phosphorus is slightly less than that of nitrogen or potassium. Available moisture capacity is moderate. Roots penetrate the fractured shale to a depth of more than 3 feet.

The soil in this unit is suited to crops, pasture, and trees. Its use for crops is limited in some areas by the climate of the high plateau, but most crops grown in the county are suited if lime and fertilizer are added. Deep placement of some of the lime helps to encourage the growth of roots. Where this soil is used for pasture, it can be grazed fairly early in spring. Desirable practices for row cropped areas are contour farming and, on long slopes, contour stripcropping. If hay and pasture are grown for only a short time in the cropping sequence, minimum tillage and good management of crop residue are essential.

CAPABILITY UNIT IIe-4

This unit consists of deep, moderately well drained, medium-textured soils. Slopes range from 2 to 10 percent.

The soils in this unit are in the Conesus, Lima, Mohawk, and Phelps series. They have a medium acid to slightly acid surface layer. In the Conesus, Lima, and Mohawk soils firm, dense, slowly permeable soil material is at a depth of 20 to 30 inches and retards drainage and the penetration of roots. At about the same depth in the Phelps soil is a slowly permeable layer of lake-laid clay.

Growth of crops on the soils in this unit is good if management is good. Although planting may be delayed briefly in spring, these soils are easily tilled. They have a moderate to high capacity for holding moisture. Practices that control runoff and erosion and conserve moisture are needed if these soils are cropped intensively.

The soils in this unit are suited to crops, pasture, and trees. Most of the acreage is cropland, and crops respond well to good management. Desirable practices for row cropped areas are contour farming, minimum tillage, and on long slopes, contour stripcropping and diversions. Tile can be used to drain wet spots.

CAPABILITY UNIT IIe-5

This unit is made up of deep, moderately well drained soils that have a silt loam surface layer and a silty clay, clay loam, or silty clay loam subsoil. Slopes range from 2 to 10 percent.

The soils in this unit are in the Darien, Hudson, Nunda, and Schoharie series. They are medium acid to slightly acid in their surface layer. The content of lime increases with increasing depth. Throughout the profile, the Nunda soil contains fragments of sandstone and shale and the Darien soil contains fragments of shale.

Although the soils in this unit are suitable for most crops, they have slight to moderate limitations. They lose some moisture through runoff, and they erode easily if left bare. The subsoil restricts the movement of water and causes slight wetness, which may briefly delay planting in spring. The surface layer clods easily, particularly on the Schoharie, Hudson, and Darien soils if tilled when too wet.

These soils can be used for crops, pasture, or trees. Grazing may be delayed slightly in spring. In row cropped areas contour farming, contour stripcropping, minimum tillage, and good management of crop residue are desirable practices. Diversions are needed in some places. Spot drainage in local wet areas may be desirable. Many wet spots occur in depressions in the undulating areas. Good management of hay and pasture is especially important for stands growing longer than 1 year.

CAPABILITY UNIT IIe-6

This unit consists of deep, moderately well drained, medium-textured soils that contain a moderate amount of sandstone and shale fragments. Slopes range from 2 to 8 percent.

The soils in this unit are in the Mardin, Langford, Culvers, and Nunda series. All of these soils, except the Nunda, have a well-expressed fragipan at a depth of 16 to 24 inches; the Nunda soil has a more clayey subsoil. All the soils have a strongly acid to medium acid surface layer. Their capacity for holding moisture and supplying plant nutrients is moderate to high. The fragipan and the clayey subsoil restrict the movement of water and cause slight wetness, which may delay planting in spring. The growing season is generally longer in areas of Nunda and Langford soils than in areas of Mardin and Culvers soils. The hazard of erosion is moderate.

The soils in this unit can be used for crops, pasture, or trees. Most of the acreage is now in forage crops. Varieties of corn that mature early should be seeded on the Mardin and Culvers soils. Where pasture and hay grow for more than 3 years, a mixture of deep-rooted and shallow-rooted legumes is well suited. Desirable practices for row cropped areas are contour farming, minimum tillage, good management of crop residue, and on long slopes, contour stripcropping and diversion terraces. Spot drainage may be needed in local wet areas.

CAPABILITY UNIT IIw-1

This unit consists of deep, moderately well drained, medium-textured soils. Slopes range from 0 to 5 percent.

The soils in this unit are in the Phelps and Scio series. The Scio soils are free of gravel and have uniform silt loam texture throughout their profile. The Phelps soils are gravelly and have more clay in their subsoil than the Scio soils. A seasonally high water table keeps drainage moderately good in all of these soils. Scio soils are acid throughout, and Phelps soils are medium acid to slightly acid in the surface layer. The content of lime increases with increasing depth.

These soils are easy to work, though planting may be delayed briefly in spring. The capacity of these soils to hold moisture is high to moderate. Crops on them respond well if management is good.

The soils in this unit are used primarily for crops, but they can be used for pasture and as woodland. Cultivated crops grow well if management is good. Desirable practices for row cropped areas are minimum tillage, returning all crop residue to the soil, planting a cover crop after each row crop, and including pasture or hay in the cropping sequence every 4 or 5 years. Artificial drainage is not needed in most places, but some small wet areas may need drainage if they are cultivated intensively.

CAPABILITY UNIT IIw-2

Only Basher and Middlebury silt loams are in this capability unit. These deep, nearly level, moderately well drained to somewhat poorly drained soils are on flood plains, are flooded occasionally, and have a seasonally high water table. The Basher soil developed in red sediments, and the Middlebury soil developed in gray sediments.

The soils in this unit are among the most productive soils in the county. Crops respond well if management is good, though planting may be delayed briefly in spring. The capacity of these soils to hold moisture and their ability to supply and retain plant nutrients are good to excellent.

These soils are suited to all crops grown in the county except those that do not tolerate wetness for short periods. Desirable practices for row cropped areas are minimum tillage, seeding a cover crop after each row crop, and returning all crop residue to the soil. Additions of lime and fertilizer are needed. Diking to prevent overflow, streambank protection, and channel improvement are desirable in some places.

CAPABILITY UNIT IIs-1

Lordstown channery silt loam, 0 to 5 percent slopes, is the only soil in this unit. This soil is well drained and strongly acid. It has a fairly high content of sandstone fragments. Depth to bedrock ranges from 20 to 40 inches. Water penetrates this soil easily, and erosion is not likely. Except where it is shallow to bedrock, this soil has good capacity to hold moisture. It is productive if management is good.

This soil is suited to crops, pasture, and trees. Most of the acreage is used for forage crops, but corn, potatoes, and cauliflower are also suitable. Varieties of corn that mature early are required in most places, because the largest areas of this soil occur at higher elevations where the growing season is relatively short. Additions of lime and fertilizer are essential for good growth of crops. The crop residue should be returned to the soil. Where this soil is used for pasture, it can be grazed fairly early in spring.

CAPABILITY UNIT IIs-2

Tunkhannock cobbly sandy loam, 0 to 5 percent slopes, is the only soil in this unit. It is a deep, somewhat excessively drained soil that has a fairly high content of cobblestones.

The use of this soil is limited by lack of moisture in the root zone in dry periods. The cobblestones interfere with tillage in some places. Erosion and runoff are not hazards.

This soil is suited to trees, crops, and pasture. In cropped areas sod-forming crops that include deep-rooted legumes are generally most desirable. Additions of lime and fertilizer are essential. Good management of sod crops is also important. This soil can be grazed early in spring.

CAPABILITY UNIT IIIe-1

This unit consists of well-drained, medium-textured soils in the uplands. These soils formed mainly in calcareous glacial till. Slopes range from 10 to 20 percent.

The soils in this unit are in the Lansing, Mohawk, Honeoye, and Farmington series. The Honeoye and Farmington soils were mapped in a complex. The Lansing, Honeoye, and Mohawk soils are deep to bedrock. The Farmington soils are shallow to limestone bedrock. The surface layer of Honeoye and Mohawk soils ranges from slightly acid to neutral, and that of Lansing and Farmington soils ranges from strongly acid to medium acid. The content of lime in the soils of this unit increases with increasing depth.

Growth of crops on the soils of this unit is good to excellent if management is good. The steepness of slopes somewhat restricts use for crops. Except where they are shallow to bedrock, these soils have good capacity for holding moisture. Because runoff is rapid, the hazard of erosion is high. Practices are therefore needed that control runoff and conserve moisture. The ability of these soils to supply plant nutrients is medium to high.

The soils in this unit are suited to crops, but they need protection from erosion where cultivated. They can also be used for pasture and as woodland. Where slopes are more than 15 percent, pasture and hay should dominate in the cropping sequence. Many kinds of forage crops can be grown. Where these soils are used for pasture, they can be grazed early in spring. In row cropped areas contour farming, contour stripcropping, and minimum tillage are desirable practices.

CAPABILITY UNIT IIIe-2

This unit consists of deep, well-drained, medium-textured soils on glacial outwash terraces and fans. Slopes range from 3 to 15 percent and commonly are complex, so contour farming is not feasible.

The soils in this unit are in the Chenango, Howard, and Tunkhannock series. They are strongly acid to medium acid in their subsoil. A gravelly and sandy substratum occurs at a depth of 2 or 3 feet and is rapidly permeable. Free lime occurs in the Howard soil at a depth of 3 to 5 feet; in the Tunkhannock and Chenango soils, free lime is below a depth of 4 feet. The capacity of these soils to hold moisture is moderate, and their ability to supply plant nutrients is medium to low. Runoff is rapid, and the hazard of erosion is moderate to high.

Crops, especially deep-rooted ones, grow well on these soils if management is good. These soils can also be used for pasture and as woodland. Where they are used for pasture, they can be grazed early in spring, but careful grazing management is needed. Desirable practices for row cropped areas are additions of lime and fertilizer, the use of cover crops, contour farming where possible, and on long slopes, contour stripcropping. Where hay or pasture is grown for more than 1 year, careful management is needed. If hay or pasture is grown for only a short period, the use of crop residue is essential.

CAPABILITY UNIT IIIe-3

This unit consists of well-drained, medium-textured soils. These soils are 20 to 40 inches deep to sandstone bedrock. Slopes range from 3 to 15 percent.

The soils in this unit are in the Lordstown and Oquaga series. They are strongly acid and have a fairly high content of sandstone fragments throughout their profile. Permeability is moderate. Except where they are shallow to bedrock, these soils have good available moisture capacity. Their ability to supply plant nutrients is medium. Because runoff is rapid, especially on the steeper or longer slopes, erosion is a severe hazard in cultivated areas. The stones in the Oquaga soils interfere with tillage in places.

The soils in this unit can be used for crops, pasture, or trees. Forage crops are generally grown on these soils, but potatoes and cauliflower are also suitable. Because the growing season is fairly short, varieties of corn that mature early grow better. Where these soils are used for pasture, they can be grazed fairly early in spring. Desirable practices for row cropped areas are minimum tillage, contour farming, contour stripcropping, and management of crop residue. Pasture and hay also require good management. Diversions generally are not feasible. Additions of lime and fertilizer are needed.

CAPABILITY UNIT IIIe-4

Mohawk and Lima silt loams, 2 to 10 percent slopes, eroded, are the only soils in this capability unit. Their surface layer ranges from slightly acid to neutral; the substratum is calcareous. These soils are moderately well drained. A firm, dense, slowly permeable substratum occurs at a depth of 15 to 25 inches and retards drainage and the penetration of roots. The continuing hazard of erosion is severe. Organic matter has been depleted from these soils, and tillage may be difficult. Where the subsoil is exposed, the surface layer crusts and clods easily if cultivated when too wet.

The soils in this unit can be used for crops, pasture, and trees. Growth of crops is fair to good if management is good. Moderate wetness delays planting in spring and may limit the kinds of crops that can be grown. Hay and pasture are better suited than cultivated crops. Desirable practices for row cropped areas are contour farming, contour stripcropping, minimum tillage, additions of lime and fertilizer, and good management of crop residue. In some places diversions are needed on long slopes. In places tile is needed to drain wet spots and to carry away leakage from diversions.

CAPABILITY UNIT IIIe-5

This unit consists of deep, moderately well drained soils that have a medium-textured surface layer and a medium-textured to moderately fine textured subsoil. Slopes range from 8 to 20 percent.

The soils in this unit are in the Conesus, Darien, and Nunda series. Their surface layer ranges from strongly acid to slightly acid. The content of lime increases with increasing depth. A firm, dense, slowly permeable substratum restricts the movement of water and the penetration of roots.

The soils in this unit are limited in their use for crops. Because runoff is rapid, erosion is a severe hazard in bare areas and practices are needed to control erosion and conserve moisture.

These soils are suited to crops, but protection from erosion is needed. They can also be used for pasture and as woodland. The slopes are steep enough to restrict the use of farm machines. In row cropped areas contour farming, contour stripcropping, and minimum tillage are desirable practices. Diversions are needed to break long slopes. Contour farming and contour stripcropping are not feasible on

the short, complex slopes in many areas of Nunda soils. Additions of lime and fertilizer and good management of pasture and hay are needed.

CAPABILITY UNIT IIIe-6

This unit consists of deep, moderately well drained, medium-textured soils. Slopes range from 8 to 15 percent.

The soils in this unit are in the Culvers, Langford, Nunda, and Mardin series. They are strongly acid to medium acid in their surface layer. Fragments of sandstone and shale occur on the surface in moderate amounts. The Culvers, Langford, and Mardin soils have a well-expressed fragipan at a depth of about 18 to 20 inches. Because of this fragipan, the water table is seasonally high and planting is delayed briefly in spring. The fragipan also lessens the available moisture and restricts the root zone. Available moisture capacity is moderate.

The Nunda soil has a dense clay loam subsoil that restricts the movement of water and causes slight wetness in spring. Its capacity to hold moisture is high, however, and its root zone is not restricted. Because runoff is rapid on all the soils, the hazard of erosion is severe in cultivated areas. The Mardin and Culvers soils generally occur where the growing season is relatively short.

The soils in this unit are suited to crops, pasture, and trees, but most of their acreage is used for forage crops. Because the growing season is short in areas of Culvers and Mardin soils, varieties of corn that mature early should be used. Additions of lime and fertilizer are needed for good growth. Where hay and pasture are grown for more than 3 years, shallow-rooted legumes, alone or mixed with deep-root legumes, should be seeded. Careful management is needed in areas where hay and pasture are grown for more than 1 year. Desirable practices for row cropped areas are minimum tillage, management of crop residue, contour farming, and contour stripcropping. In some places diversions are needed to break long slopes and to intercept runoff from adjacent areas.

CAPABILITY UNIT IIIe-7

Schoharie and Hudson silt loams, 6 to 12 percent slopes, are the only soils in this unit. These soils are deep, are moderately well drained, and have a clayey subsoil. The Schoharie soil developed from red sediments, and the Hudson soil developed from olive-brown sediments. These soils have a medium acid to slightly acid surface layer. The content of lime increases with increasing depth.

The soils in this unit can be used for crops, pasture, and trees. Runoff is rapid and erosion is a high hazard in cultivated or unprotected areas. Planting may be briefly delayed in spring because of slight wetness. These soils clod easily unless management is good. They are better suited to pasture and hay than to cultivated crops. Good management of the pasture and hay is important. Desirable practices for row cropped areas are minimum tillage, contour farming, contour stripcropping, and good management of crop residue. Well-established grassed waterways that are common on long slopes should be left in sod when this soil is tilled. These slopes may require diversions.

CAPABILITY UNIT IIIe-8

Schoharie and Hudson silty clay loams, 2 to 6 percent slopes, eroded, are the only soils in this unit. They formed in lake-laid silts and clays. The Schoharie soil formed in red sediments, and the Hudson soil formed in olive-brown sediments. These soils are well drained to moderately well drained.

Erosion has depleted the organic matter in these soils and has exposed clayey material from the subsoil. The surface layer is highly susceptible to clodding. The clayey subsoil restricts the movement of water, and moderate wetness delays planting in spring and may affect the growth of crops. On these soils runoff is moderate, and the hazard of erosion is severe.

The soils in this unit can be used for crops, for pasture, and as woodland. Growth of selected crops is fair to good. Protection from erosion is needed in cultivated areas. Hay and pasture should dominate in the cropping sequence. Areas where rills and gullies are common should be left in sod when these soils are tilled. Desirable practices for row cropped areas are minimum tillage, management of crop residue, contour farming, and on long slopes, stripcropping. Contour farming, however, is not feasible on short, complex slopes. Local wet spots can be drained with tile. Diversions are needed to break long slopes and to intercept runoff from adjacent areas.

CAPABILITY UNIT IIIe-9

This unit consists of somewhat poorly drained, medium-textured soils on uplands. Slopes range from 8 to 15 percent.

The soils in this unit are in the Darien series. Their surface layer ranges from medium acid to slightly acid. The content of lime increases with increasing depth. In some areas fragments of sandstone and shale are common on the surface. The clayey subsoil slows the movement of water through these soils, and planting may be delayed in spring. The ability of these soils to supply plant nutrients is medium to high.

Growth of selected crops on the soils in this unit is good if management is good. Because runoff is rapid, the amount of moisture retained for plant use is limited and the hazard of erosion is high.

These soils can be used for crops, pasture, and trees. Use for row crops is limited by steepness of slope and the hazard of erosion. Operating modern farm machinery is difficult. In undrained areas legumes tolerant of wetness should be seeded. Additions of lime and fertilizer are essential for good growth of plants. Good management of hay and pasture is important. Desirable practices in row cropped areas are minimum tillage, the use of crop residue, graded rows, grassed waterways, and on long slopes, stripcropping. In areas of close-growing crops, graded tillage is needed. Diversions are needed in some places to break long slopes and to intercept runoff from adjacent areas.

CAPABILITY UNIT IIIe-10

Odessa and Rhinebeck silt loams, 6 to 12 percent slopes, are the only soils in this unit. These somewhat poorly drained soils formed in lake-laid sediments and have a clayey subsoil. The Odessa soil formed in red sediments, and the Rhinebeck soil formed in olive-brown sediments.

These soils have a medium acid to neutral surface layer and a calcareous substratum. Their ability to supply plant nutrients is medium to high. The clayey subsoil restricts the movement of water and causes moderate wetness that delays planting in the spring. Although capacity to hold moisture is high, some moisture is lost through runoff

and drought is likely during the growing season. These soils are susceptible to erosion, and they clod easily if mismanaged.

The soils in this unit can be used for crops, pasture, or trees. Growth of selected crops is fair to good. Unless drainage is effective, legumes tolerant of moderate wetness should be used, especially if they are grown for more than 3 years. Additions of lime and fertilizer are essential for good plant growth. Where these soils are used for pasture, grazing should be delayed early in spring. Desirable practices for row cropped areas are graded rows, stripcropping, grassed waterways, minimum tillage, and the use of crop residue. Graded tillage and grassed waterways are needed in areas of close-growing crops.

CAPABILITY UNIT IIIe-11

This unit consists of deep, somewhat poorly drained, medium-textured soils on uplands. Slopes range from 8 to 15 percent.

The soils in this unit are in the Burdett, Erie, Morris, and Volusia series. They have a strongly acid to medium acid surface layer. The Volusia, Erie, and Morris soils have a very dense fragipan at a depth of 10 to 18 inches. This fragipan seriously restricts the movement of water and air and the penetration of roots. Moderate wetness delays planting and affects the growth of crops in wet periods. Available moisture capacity of the Volusia, Erie, and Morris soils is low, and plants on these soils show the effects of moisture deficiency earlier than do plants on the deeper soils nearby.

In the Burdett soil a dense clay loam layer, at a depth of about 18 inches, restricts the movement of water but can be penetrated by roots. The Burdett soil has high available moisture capacity. Except for the Burdett soil, the ability of the soils in this unit to supply plant nutrients is medium. The Burdett soil has higher natural fertility than the other soils.

Erosion and loss of moisture through runoff are limitations to the use of the soils in this unit, but growth of selected crops is fair if management is good.

These soils can be used for crops, pasture, and trees. Additions of lime and fertilizer are essential to good plant growth. Legumes tolerant of wetness are well suited, especially if they are grown for more than 3 years. Varieties of corn that mature early should be used on the Volusia and Morris soils, for these soils generally occur where the growing season is relatively short. Where these soils are used for pasture, grazing is delayed in spring. Desirable practices for row cropped areas are the use of graded rows, grassed waterways, stripcropping, minimum tillage, and good management of crop residue. Diversions may be needed to break long slopes and to intercept runoff from adjacent areas.

Closely spaced diversions, combined with spot drainage, increase the use of these soils. In areas of close-growing crops, graded tillage and grassed waterways are needed.

CAPABILITY UNIT IIIe-12

The only soil in this unit is Darien silty clay loam, 2 to 8 percent slopes, eroded. It is somewhat poorly drained; its dense clayey substratum restricts the movement of water and air. This soil has a medium acid to slightly acid surface layer. The content of lime increases with increasing depth.

Use of this soil is limited mainly by erosion, though other limitations are important. Moderate wetness in spring and during other wet periods delays planting and affects the growth of crops. Available moisture capacity is high. Erosion has depleted the organic-matter content and has exposed a heavy surface layer that clods easily unless management is good. Because slopes are as much as 8 percent, runoff may cause moderate loss of moisture. There is also a severe hazard of erosion. Practices that control runoff and erosion and conserve moisture are needed.

This soil can be used for crops, for pasture, and as woodland. Fair to good growth of selected crops can be expected if management is good. Cropping systems that improve this soil and additions of lime and fertilizer are needed. Unless drainage is effective, legumes tolerant of wetness should be used, especially where they are grown for long periods. This soil is not suited to grazing early in spring. Suitable for row cropped areas are graded rows, grassed waterways, stripcropping, minimum tillage, and good management of crop residue. In some places diversion terraces are needed to break long slopes and to intercept runoff from other soils. Drainage diversions or tile lines are beneficial in places.

CAPABILITY UNIT IIIw-1

This unit consists of medium-textured soils that are somewhat poorly drained, poorly drained, or very poorly drained and have a high water table. These soils are nearly level and occur on gravelly outwash.

The soils in this unit are in the Fredon, Halsey, and Red Hook series. The Red Hook soil is acid throughout its profile. The Fredon and Halsey soils have a slightly acid to neutral surface layer, but they become calcareous with increasing depth. Red Hook and Fredon soils are somewhat poorly drained, and the Halsey soil is poorly drained and very poorly drained. All of these soils are moderately permeable to rapidly permeable. Their ability to supply plant nutrients is medium. Wetness is the main limitation to use of these soils, but under good management that includes drainage, good growth of crops can be expected.

The soils in this unit are suited to crops, pasture, and trees. They can be intensively cropped to vegetables and other crops if drainage is adequate. In undrained areas crops that tolerate wetness should be used. The wetter areas of the Halsey soil are better suited to pasture than to crops. Additions of lime and fertilizer are essential to good growth of plants. Minimum tillage and good management of crop residue help in maintaining favorable soil structure.

CAPABILITY UNIT IIIw-2

The only soil in this unit, Volusia channery silt loam, 0 to 3 percent slopes, is deep and strongly acid. At a depth of 10 to 18 inches is a dense, very slowly permeable fragipan that restricts the movement of air and water and the penetration of roots. This fragipan causes moderate wetness that delays planting and affects plant growth during wet periods. Because available moisture is low, plants on this soil show the effects of moisture deficiency earlier during dry periods than do plants on soils that have a deeper root zone. This soil has medium to low ability to supply plant nutrients. Wetness is the primary limitation to the use of this soil.

This soil can be used for crops, pasture, and trees. Effective drainage improves suitability of this soil for crops, but growth of crops, even in drained areas, is only fair. In undrained areas, only plants tolerant of wetness should be used. Forage crops are generally better suited than other crops. Shallow-rooted legumes and grasses grow well. Because the growing season is short in areas of this soil, varieties of corn that mature early should be planted. Additions of lime and fertilizer are essential for good growth. Where this soil is used for pasture, it should not be grazed early in spring.

CAPABILITY UNIT IIIw-3

This unit consists of somewhat poorly drained, medium-textured, lake-laid soils. Slopes range from 0 to 6 percent.

The soils in this unit are in the Odessa and Rhinebeck series. The Odessa soil formed in red sediments, and the Rhinebeck soil formed in olive-brown sediments. These soils have a medium acid to slightly acid surface layer; they are calcareous as depth increases. The subsoil is clayey and restricts the movement of water. Ability to supply plant nutrients is medium to high, and growth of selected crops is fair to good. Available moisture capacity is high. Unless drainage is effective, moderate wetness delays planting in spring. These soils clod easily. Wetness is the major limitation, but there is also a hazard of erosion in areas that are not managed well.

The soils in this unit can be used for crops, for pasture, and as woodland. Unless these soils are effectively drained, legumes tolerant of wetness should be used, especially where they are to grow for more than 3 years. Additions of lime and fertilizer are essential to good growth of plants. These soils are not suitable for grazing early in spring. Desirable practices for row cropped areas are graded rows, grassed waterways, minimum tillage, good management of crop residue, and on long slopes, diversions.

CAPABILITY UNIT IIIw-4

This unit consists of deep, somewhat poorly drained, medium-textured soils on uplands. Slopes range from 2 to 8 percent.

The soils in this unit are in the Burdett, Darien, Erie, Morris, and Volusia series. They have a strongly acid to medium acid surface layer.

In the Volusia, Erie, and Morris soils, at a depth of 10 to 18 inches, a very dense fragipan seriously restricts the movement of water and air and the penetration of roots. It causes moderate wetness that delays planting and affects the growth of crops during wet periods. Nevertheless, the Volusia, Erie, and Morris soils have low moisture supplying capacity, and plants grown on them show damage from moisture deficiency sooner than do plants grown on the other soils in this unit.

Instead of a fragipan, Burdett and Darien soils have a clayey subsoil at a depth of about 15 to 18 inches. This clayey layer restricts the movement of water, but it can be penetrated by roots. The moisture supplying capacity of these soils is high. The Erie, Morris, and Volusia soils have medium ability to supply plant nutrients, but this ability, especially for supplying potassium, is slightly higher in the Burdett and Darien soils.

The major limitation to use of all of these soils is wetness, but there is also a moderate hazard of erosion. Crops grow fairly well on these soils if management is good.

The soils in this unit can be used for crops, pasture, and trees. Additions of lime and fertilizer are essential to good plant growth. These soils are suited to corn for silage, oats, and forage crops tolerant of seasonal wetness. Varieties of corn that mature early should be grown on the Volusia and Morris soils because they occur where the growing season is relatively short. The soils in this unit are not suitable for grazing early in spring. Desirable practices for row cropped areas are minimum tillage and use of graded rows, grassed waterways, diversions, and good management of crop residue. Spot drainage may be needed in some areas.

CAPABILITY UNIT IIIw-5

Appleton channery silt loam, 2 to 8 percent slopes, is the only soil in this unit. It is a deep, somewhat poorly drained soil on uplands. The surface layer ranges from medium acid to neutral. The subsoil is a little more clayey than the surface layer and is underlain by firm, dense, calcareous glacial till that restricts the movement of water. Moderate wetness in spring and in other wet periods may delay planting and affect the growth of crops.

The ability of this soil to supply plant nutrients and moisture is high. Wetness is the major limitation, but there is also a moderate hazard of erosion. Good to excellent growth of most crops can be expected on this soil if drainage is effective and management is good.

This soil is used for crops, pasture, and trees. If it is drained, it is suited to most crops commonly grown in the county, including corn for silage, grain, oats, and mixtures of alfalfa and grass. Hay and pasture plants tolerant of wetness are suitable for undrained areas. Additions of lime and fertilizer are needed. This soil is not suitable for grazing early in spring. All areas used for crops should be drained. Desirable practices in row cropped areas are use of graded rows, grassed waterways, stripcropping, minimum tillage, and good management of crop residue. Diversions are needed to intercept runoff from adjacent areas. Careful management of hay and pasture is needed, especially where the hay and pasture plants are grown for long periods.

CAPABILITY UNIT IIIs-1

This unit consists of flaggy and shaly silt loams that are shallow, well drained to moderately well drained, and nearly level to steep.

These soils are in the Arnot and Nassau series. They are strongly acid to very strongly acid. In most places these soils are less than 20 inches deep to sandstone, siltstone, or shale bedrock. Fragments of sandstone or shale are common, and in places they interfere with tillage. In other places bedrock crops out or is near enough to the surface to restrict the use of these soils. These soils are droughty, and their ability to supply plant nutrients is medium to low. Runoff is rapid from the more sloping areas, and the hazard of erosion is moderate to high.

These soils can be used for crops, but better uses are pasture or woodland. Shallow-rooted plants that can tolerate dryness are desirable. If corn is grown, varieties that mature early should be used because these soils occur where the growing season is relatively short. Additions of lime and fertilizer are needed. Where these soils are used for pasture, they can be grazed early in spring, but careful grazing management is needed. Desirable practices for row cropped areas are contour farming, contour stripcropping, minimum tillage, and good management of crop

residue. Contour tillage is needed in areas of close-growing crops.

CAPABILITY UNIT IVe-1

Mohawk and Honeoye silt loams, 20 to 30 percent slopes, are the only soils in this capability unit. These deep, well-drained, loamy soils are on uplands. The content of lime is high. Plant nutrients are plentiful. Although moisture capacity is high, much water is lost in the rapid runoff. Also, the erosion hazard is severe, and the steep soils are difficult to work. Growth of plants is fair to good if management is good.

The soils in this unit can be used for limited cropping, for pasture, and as woodland. Because these soils are erodible and difficult to work, hay and pasture are more suitable than other crops. Grazing may be the most practical method of harvesting forage, particularly in the steeper areas. Grazing can be started early in spring. If areas are reseeded, the seeding should be in narrow strips on the contour. Essential to good growth is careful management of hay and pasture. All crops require ample use of fertilizer.

CAPABILITY UNIT IVe-2

This unit consists of deep, well drained and moderately well drained, loamy soils. These soils occur on uplands and are eroded. Slopes range from 8 to 20 percent.

The soils in this unit are in the Darien, Honeoye, Lansing, Mohawk, and Nunda series. The content of lime is high in the Honeoye and Mohawk soils and is medium in the Darien and Nunda soils. On these soils erosion has removed the original surface layer and exposed a heavier surface layer. The content of organic matter is reduced and the plow layer clods easily. Available mositure capacity is moderate to high, but much water is lost in the rapid runoff, and the hazard of further erosion is severe.

The soils in this unit can be used for crops, pasture, and trees. Growth of cultivated crops is only fair, but hay and pasture plants grow well and should dominate in the cropping sequence. Although these soils contain lime, additions of lime and fertilizer are essential to good growth of plants. Minimum tillage, contour stripcropping, and grassed waterways are needed in row cropped areas. Diversions are commonly needed to break up long slopes and to intercept runoff from adjacent areas.

CAPABILITY UNIT IVe-3

This unit consists of well drained and moderately well drained, loamy soils that have a strongly acid to medium acid surface layer. Slopes range from 15 to 25 percent.

The soils in this unit are in the Cattaraugus, Culvers, Langford, Lordstown, Mardin, Nunda, and Oquaga series. They are channery or stony. The Cattaraugus, Mardin, Langford, and Culvers soils have a moderate or strong fragipan at a depth of 18 to 30 inches. Depth to the fragipan generally is more than 24 inches in the well drained Cattaraugus soil and is less than 24 inches in the moderately well drained Mardin, Langford, and Culvers soils. The Nunda soil has a somewhat dense clay loam layer at a depth of about 18 to 30 inches. The Lordstown and Oquaga soils are 20 to 40 inches deep over sandstone bedrock.

Steepness and excessive runoff restrict use of the soils in this unit. Although the capacity of these soils to hold moisture is moderate to fairly high, much water is lost in runoff. Use of modern farm equipment is difficult and hazardous on the steep slopes.

The soils in this unit can be used for limited cropping, for pasture, and as woodland. Because of the severe hazard of erosion and the difficulty of working the soils, hay and pasture are preferred. Grazing may be the most practical method of harvesting forage, especially in the steeper areas. If grazed areas are reseeded, tillage should be on the contour in narrow strips. Existing waterways should be left in grass. Essential to good plant growth is careful management of hay and pasture. Additions of lime and fertilizers are needed for all crops.

CAPABILITY UNIT IVe-4

This unit consists of moderately well drained, eroded channery silt loams on uplands. Slopes range from 8 to 15 percent.

The soils in this unit are in the Langford, Mardin, and Nunda series. The Mardin and Langford soils have very slowly permeable fragipan at a depth of 12 to 18 inches; the Nunda soil has a somewhat dense, slowly permeable subsoil at a depth of about 12 to 18 inches. These soils are moderately wet and planting is delayed in spring, because erosion has depleted the organic matter and has lessened the depth to the fragipan or the dense subsoil. Also, the growth of crops is affected by erosion. The root zone is shallower and available moisture capacity is less in the Mardin and Langford soils than in the Nunda soil. Runoff is rapid on all of these soils, and erosion is a hazard.

The soils in this unit can be used for crops and pasture and as woodland. Growth of selected crops is fair if management is good. Pasture and hay should dominate in the cropping sequence. Plant varieties that tolerate wetness should be seeded, especially in stands that grow for a long time. Varieties of corn that mature early should be seeded on the Mardin soil. Additions of lime and fertilizer are essential for favorable growth of plants. Desirable practices for row cropped areas are use of minimum tillage, graded rows, stripcropping, and grassed waterways. Graded tillage is needed in some areas of close-growing crops. In some places diversions are needed to break long slopes and to intercept runoff from adjacent areas. In some of the less well drained local areas, drainage may be needed.

CAPABILITY UNIT IVe-5

This unit consists of somewhat poorly drained, eroded silty clay loams that have a slightly acid surface layer but that are calcareous as depth increases. Slopes range from 6 to 15 percent.

The soils in this unit are in the Darien, Odessa, and Rhinebeck series. Fragments of sandstone and shale are common in the Darien soil but are missing in the Odessa and Rhinebeck soils. All of these soils have a slowly permeable clayey subsoil and substratum and are moderately wet in spring and during other wet periods. Available moisture capacity is good, and ability to supply plant nutrients is fair. Erosion has depleted the organic matter and has exposed clayey material that clods easily if plowed when too wet. Because runoff is rapid, moisture needed for crops is lost and erosion is a very severe hazard.

These soils can be used for crops, pasture, and trees. Crops, especially sod-forming ones, grow fairly well if management is good. Hay or pasture should dominate in

the cropping sequence, and plant varieties that tolerate wetness should be used in undrained areas. Growing row crops for more than 1 year is not advisable. These soils are not suitable for grazing early in spring. Adequate additions of lime and fertilizer and careful management of hay and pasture are essential. Other desirable practices are minimum tillage, graded rows, stripcropping, graded tillage, and grassed waterways. In some areas diversions are needed to break long slopes and to intercept runoff from adjacent areas. Spot drainage of local wet areas is also needed.

CAPABILITY UNIT IVe-6

Schoharie and Hudson silty clay loams, 6 to 12 percent slopes, eroded, are the only soils in this unit. These soils contain lime. Their capacity to hold moisture is high, and their ability to supply plant nutrients is fair. Erosion has depleted the organic matter and has exposed clayey material that clods easily if plowed when wet. On these soils, runoff is rapid and erosion is a severe hazard.

The soils in this unit can be used for crops, pasture, or trees. Growth of crops is only fair. Row crops should not be grown for 2 successive years. Hay and pasture plants grow better than other crops and should dominate in the cropping sequence. Most varieties of legumes and grasses are suitable. Careful management of hay and pasture is needed for good growth of plants. Although these soils contain lime, adequate additions of lime are essential, as are large additions of fertilizer. Desirable practices for row cropped areas are use of minimum tillage, contour stripcropping, contour tillage, and grassed waterways. Diversion terraces are needed to break some long slopes and to intercept runoff from adjacent areas. In places drainage of local wet spots is needed.

CAPABILITY UNIT IVe-7

This unit consists of moderately well drained and well drained, medium-textured soils on uplands. Slopes range from 15 to 30 percent.

The soils in this unit are in the Darien and Nunda series. They have a moderately fine textured subsoil, a strongly acid to slightly acid surface layer, and a calcareous substratum. The ability of these soils to supply plant nutrients is high. Steep slopes are the main limitations to use. Although available moisture capacity is high, runoff is rapid and water needed for growth of plants is lost. Also, erosion is a very severe hazard. These soils are steep enough to make the use of farm machinery difficult and hazardous.

The soils in this unit can be used for limited cropping, for pasture, and for trees. Sod crops are better suited than other crops, and most varieties of legumes and grasses can be grown. Grazing may be the most practical method of harvesting forage, especially on the steeper slopes. In reseeding grazed areas, tillage should be on the contour in narrow strips. Essential for good growth of plants are adequate additions of lime and fertilizer and careful management of sod. The existing waterways should be left in sod.

CAPABILITY UNIT IVe-8

This unit consists of deep, well-drained to excessively drained soils that are medium textured and strongly acid. These soils developed in deposits of gravel and sand. Slopes range from 15 to 35 percent.

The soils in this unit are in the Tunkhannock and Chenango series. Their ability to supply plant nutrients is medium to low. Steepness and lack of sufficient moisture are the major limitations to use of these soils.

The steeper parts of this unit should be left in sod or trees, though the less steep parts can be used for limited cropping. Deep-rooted grasses and legumes should be selected so that moisture deep in the soils can be used. Grazing can be started early in spring and is the most practical method of harvesting forage on the steeper slopes. Reseeding should be on the contour where feasible, but is not practical in many places because slopes are short and complex.

CAPABILITY UNIT IVw-1

This unit consists of deep, poorly drained and very poorly drained, medium-textured soils that contain lime. Slopes range from 0 to 3 percent.

The soils in this unit are in the Ilion, Lakemont, Lyons, and Madalin series. They have a slightly acid to neutral surface layer. All of these soils, except the Lyons, have a clayey subsoil.

Wetness is the major limitation to the use of these soils. Under good management that includes drainage, fair growth of selected crops can be expected.

If the soils in this unit are drained, they can be used for corn, oats, and hay. Undrained areas are better suited to pasture and trees. Partly drained areas are not suited to corn, and they can be grazed only from late in spring to midsummer. Minimum tillage and good management of residue are essential for row cropped areas. Additions of lime and fertilizer are also important.

CAPABILITY UNIT IVw-2

This unit consists of poorly drained and very poorly drained, medium-textured and moderately fine textured soils. Slopes range from 2 to 15 percent.

The soils in this unit are in the Appleton, Ilion, Lakemont, Lyons, and Madalin series. Although the Appleton soil is slightly better drained than the other soils in this unit, it occurs alone in only a few areas. Most areas are near the wetter Ilion soils and are used in the same way.

Wetness is the major limitation to use of these soils, but there is also a moderate hazard of erosion in cultivated areas. Also, these soils clod easily if they are not managed well. Growth of crops is good if these soils are properly managed.

If drained, the soils in this unit can be used for corn, oats, and hay. Undrained, they are better suited to pasture or trees. The varieties of grasses and legumes should be selected according to the effectiveness of drainage. Grazing is delayed in spring. Desirable practices for row cropped areas are drainage, minimum tillage, graded rows, stripcropping, and grassed waterways. Diversions are needed on long slopes. Good management of crop residue and sod crops is essential. Additions of lime and fertilizer may be needed for good growth of plants. In areas of close-growing crops, graded tillage and grassed waterways are needed.

CAPABILITY UNIT IVw-3

This unit consists of very poorly drained to somewhat poorly drained, medium-textured soils on uplands. Slopes range from 0 to 15 percent.

The soils in this unit are in the Allis, Chippewa, Lyons, Norwich, and Tuller series. The Lyons, Tuller, and Allis soils are 10 to 30 inches thick over bedrock. The Chippewa and Norwich soils have a dense fragipan at a depth of

about 15 to 18 inches, and they contain enough stones to interfere with cultivation. All of these soils except the Lyons are strongly acid; the Lyons soil has a high content of lime. Wetness is the major limitation to use of these soils. Effective drainage is not practical in most places, because bedrock or the dense fragipan is too near the surface.

The soils in this unit are better suited to hay, pasture, or trees than to crops. Row crops can be grown only in a few areas of Tuller and Allis soils. These areas are generally in the better drained parts of the steeper slopes. Practices are needed to control erosion. Legumes and grasses tolerant of wetness should be selected for reseeding pasture. Sloping areas should be reseeded in contour strips, and existing waterways should be left in sod. Additions of lime and fertilizer and good management of hay and pasture are essential to good growth of plants. These soils are not suitable for grazing in spring.

CAPABILITY UNIT IVw-4

This unit consists of very poorly drained to somewhat poorly drained silt loams on flood plains.

The soils in this unit are in the Holly, Papakating, and Wayland series. The Wayland soil is less acid than the Holly and Papakating soils. Wetness and flooding are the main limitations to use of the soils in this unit. Crops grow well in drained areas where flooding is prevented.

Undrained areas of these soils are better suited to pasture or trees than to crops. The effectiveness of drainage determines the cropping sequence used and the crops grown. Locally, row crops can be grown year after year. Legumes and grasses tolerant of wetness grow well. Additions of lime and fertilizer and careful management of pasture and hay are needed for good growth of plants.

CAPABILITY UNIT Vw-1

This unit consists only of Alluvial land, a land type that is flooded frequently. Drainage ranges from excessive to very poor, and the soil material ranges from gravelly and cobbly to clayey. Some areas can be used for pasture or wildlife food and cover. Cultivating this land generally is not feasible.

CAPABILITY UNIT VIe-1

This unit consists of medium-textured and moderately fine textured soils. Some of these soils are channery and some are stony. Slopes range from 12 to 40 percent. Some of the less steeply sloping soils are eroded.

The soils in this unit are in the Cattaraugus, Hudson, Mardin, Nunda, Oquaga, and Schoharie series. Although the capacity of these soils for holding moisture is good, much water is lost through very rapid runoff.

The soils in this unit are not suited to cultivated crops. They are steep enough in most places to make the use of farm machinery hazardous. Because erosion is a constant hazard, most areas should be kept in sod or trees. In the less steep areas of eroded Schoharie and Hudson soils, it is worthwhile to establish and maintain improved pasture of long-lived grasses and legumes, because lime and fertilizer can be spread and mowers operated. Moderately good growth of these plants can be expected. All of these soils are suitable for grazing in spring.

CAPABILITY UNIT VIs-1

Nassau shaly silt loam, 15 to 35 percent slopes, is the only soil in this unit. This soil is shallow and excessively drained. Shale bedrock occurs at a depth of 10 to 20 inches, and shale fragments can be easily seen in the soil mass. Most of the surface layer has been lost from about 25 percent of each area.

This soil can be used for pasture, but it is better suited to trees or to wildlife food and cover. Some areas can be grazed early in spring. Because this soil is shallow and droughty, growth of plants is poor, even if lime and fertilizer have been added. Areas used for improved pasture should be seeded in strips on the contour.

CAPABILITY UNIT VIs-2

This unit consists of very stony, deep, well-drained and moderately well drained, medium-textured soils that contain lime. Slopes range from 3 to 30 percent.

The soils in this unit are in the Mohawk and Lansing series. They are too stony for cultivation, and removing the stones is not feasible in most areas. They are good sites for pasture, trees, and wildlife food and cover. Because these soils are fertile and have fairly high available moisture capacity, native grasses should be encouraged by practices that include reseeding by hand.

CAPABILITY UNIT VIs-3

Farmington very rocky silt loam, 0 to 10 percent slopes, is the only soil in this unit. Bedrock is at a depth of 20 inches or less. Tillage is prevented by rock outcrops and sinkholes. This soil is droughty, but some areas are suitable for limited grazing early in spring and late in fall. Pasture improvement is difficult, but it is desirable in some places. This soil is also suited to trees and wildlife food and cover.

CAPABILITY UNIT VIIe-1

This unit consists of well-drained to excessively drained soils. Slopes range from 25 to 70 percent.

The soils in this unit are in the Cattaraugus, Chenango, Honeoye, Lordstown, Mardin, Mohawk, and Tunkhannock series. Because runoff is very rapid, much water is lost and the hazard of erosion is very severe.

The soils in this unit are better used as woodland and wildlife habitat than for other purposes. They are too steep and, in some areas, too stony for cultivated crops, and their use for pasture is severely limited. The use of farm machinery on these soils is impractical and dangerous. Long-lived legumes can be grown on the lesser slopes. Grazing, however, is the only practical method of harvest, and it should be regulated so that a protective cover is kept on these soils.

CAPABILITY UNIT VIIw-1

This unit consists of highly organic soils that are wet the entire year. These are slightly acid and strongly acid muck and peat soils.

In Schoharie County most areas of these soils have not been improved by drainage. Undrained areas may provide some pasture but are better suited as woodland or wildlife habitat.

CAPABILITY UNIT VIIs-1

This unit consists of well-drained and excessively drained, very stony soils. Slopes range from 0 to 70 percent.

The soils in this unit are in the Farmington, Lordstown, Nassau, and Oquaga series. They are shallow to bedrock, and outcrops of rock are common. All of these soils are better suited to trees and as wildlife habitat, but pasture of low grade can be grown in the gently sloping and moderately sloping areas of the Lordstown and Oquaga soils.

CAPABILITY UNIT VIIs-2

This unit consists of deep, well-drained to very poorly drained, very stony soils. Slopes range from 0 to 35 percent.

The soils in this unit are in the Chippewa, Culvers, Erie, Ilion, Lyons, Mardin, Morris, Norwich, and Volusia series. Rock fragments more than 10 inches in diameter cover from 10 to 15 percent of the surface of each area.

The soils in this unit are suited to trees if management is good. These soils are too stony and, in some places, too wet for cultivation. Clearing away the stones and draining the soils generally are not feasible. Some areas can be used for pasture of low grade. If management is good, trees of good quality can be grown in places, but some areas are better suited as wildlife habitat.

Estimated Yields [4]

Table 1 shows, for most soils in Schoharie County, the estimated average acre yields of principal crops. The yields are averages over a long period of those expected under two levels of management. Yields in any one year may be as much as 20 percent less or 20 percent more than those shown in the table. The very steep, very stony, very rocky, and wet organic soils are not listed in table 1, because they are not suited to crops.

In table 1 the yields in columns A are obtained under average management, or management commonly followed by most farmers in the county. Under average management, the soils used for corn receive, before seeding, approximately 10 tons of manure per acre, and a sod crop, with or without legumes, is plowed into the soil. Nitrogen (N), phosphorus (P), and potassium (K) are applied, but in amounts about 30 to 50 percent below those suggested in the annual "Cornell Recommends for Field Crops." The soils used for hay crops receive little or no commercial fertilizer. The lime status generally is pH 6.0 or less in the surface soil of acid soils. Recommended methods for applying fertilizers and liming are followed only about 50 percent of the time.

The yields in columns B of table 1 are obtained under good management, or management that includes good soil conservation practices. This level of management is considered high or above average. At this level, the soil is used within its capability. Cropping systems and other management practices are used so that runoff is reduced and soil losses are held within allowable limits, moisture is conserved, drainage is improved, and the organic-matter content and good soil structure are maintained. Lime and fertilizer are applied according to the needs indicated by soil tests and field observations; the annual "Cornell Recommends for Field Crops" is used as a guide.

In Schoharie County, vegetables are grown for commercial use on several farms in the broad, level areas on the lowlands along Schoharie Creek. These crops are not included in table 1. Soils on which most vegetable crops are grown for sale are in the Barbour and Basher series. The estimated acre yield of potatoes grown under a high level of management is 300 to 600 bushels. Other acre yields expected are 100 to 145 bushels of corn, 15 to 30 tons of carrots, 28 tons of squash, 8 to 10 tons of spinach, 2 to 2½ tons of peas, and 8 tons of parsnips.

Use of Soils for Woodland [5]

According to the 1965 projection of the New York State Soil and Water Conservation Needs Inventory, woodland makes up nearly 187,000 acres or about 47 percent of the total land area of Schoharie County. Almost all this woodland is in commercial timber. Approximately 32,000 acres is owned by the State. Most of the wooded land owned by the State is in the Lordstown-Mardin and Oquaga-Culvers-Morris soil associations.

In this county the average-sized woodlot on farms is 34 acres, but in Carlisle, Cobleskill, Esperance, Seward, Sharon, Summit, and Wright Townships the woodlots average less than 25 acres. In Broome, Conesville, Jefferson, Middleburg, and Richmondville Townships the size of woodlots ranges from 25 to 50 acres; and in Fulton, Gilboa, and Schoharie Townships the average size is more than 50 acres. In some small scattered areas in the county, trees have been planted on farms, but most of the larger planted areas are owned by the State and county. On abandoned land that is suitable for planting, Norway spruce and red pine are considered to have the best potential for producing timber. Hardwoods on the higher elevations in the southern and central parts of the county are severely damaged by ice.

Forest cover types occurring in the county include northern hardwood, white pine-northern hardwood, oak-northern hardwood, and hemlock-northern hardwood (*13*).[6]

The predominant species of the northern hardwood forest cover type are beech, yellow birch, and sugar maple, but some red maple, white pine, white ash, basswood, paper birch, hemlock, and black cherry also occur. In places white pine grows in pure stands adjoining areas of northern hardwoods. Red, white, black, and chestnut oaks grow in nearly pure stands in patches adjoining areas of northern hardwoods, or these oaks are mixed fairly well throughout the stands. Hemlock occurs in pure stands adjoining areas of northern hardwoods or is mixed into these areas.

White pine is highly susceptible to white pine weevil and to blister rust; therefore, it is somewhat limited for use in planting. It is reseeding naturally in some abandoned fields in Gilboa and Wright Townships. Sugar maple occurs in numbers sufficient to increase the income of the county from the sale of maple sirup and other products. Several large sugar bushes are operated in the southern part of Jefferson Township. Red pine was uncommon in the original stand of trees in the county. It now occurs in widely scattered small stands on shallow, rocky soils, particularly on dry bluffs along Schoharie Creek. Red pine grows fairly well on these soils, but experience in planting red pine on shallow, fine-textured, somewhat

[4] R. BRADLEY, soil conservationist, Soil Conservation Service, and S. WRIGHT and F. BRUEK, Schoharie County agricultural extension agents, assisted in estimating the yields in table 1.

[5] By MEREDITH PETERS and ROBERT E. SMITH, JR., woodland conservationists, Soil Conservation Service.

[6] Italic numbers in parentheses refer to Literature Cited, p. 151.

poorly drained soils has been disappointing. Idle fields tend to be reseeded in trees that naturally reseed in old fields, mainly aspen, pin cherry, gray birch, white pine, and red maple. Many of these species later are replaced by black cherry, sugar maple, hemlock, or white ash.

Woodland suitability groups

To assist woodland owners in planning the use of their soils, the soils of Schoharie County have been placed in 10 woodland suitability groups. Each group is made up of soils that have similar potential productivity, similar limitations and hazards, and similar suitability for kinds of trees. In table 2 the 10 woodland suitability groups in the county are briefly described, their potential productivity and limitations and hazards are rated, and trees suited to each group are given. To find the names of the soils in each group, refer to the "Guide to Mapping Units" at the back of this survey.

TABLE 1.—*Estimated average acre yields of principal crops under two levels of management*

[Yields in columns A are to be expected under management common in the county; those in columns B, under improved management. Absence of yield indicates that crop is not commonly grown at that level of management, or that soil is not suited to crop specified. Steep, very steep, very stony, very rocky, and wet organic soils are not listed]

Soil	Corn				Oats		Forage mixture									
	Silage		Grain				Alfalfa-grass [1]		Alfalfa-grass [2]		Alfalfa-birdsfoot trefoil-grass [3]		Birdsfoot trefoil-grass [4]		Birdsfoot trefoil-grass [5]	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Tons	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*
Appleton channery silt loam, 2 to 8 percent slopes	8	10			40	55					2.0	2.5	2.0	2.5	1.5	2.0
Arnot flaggy silt loam, 0 to 15 percent slopes					35	45	2.0	2.5	2.0	2.5	2.0	2.5	1.5	2.5	1.0	1.5
Barbour and Tioga fine sandy loams	15	18	75	90	55	75	4.0	5.5	3.5	4.5	3.0	3.5	3.0	3.5	2.0	2.5
Barbour and Tioga gravelly loams, fans, 0 to 8 percent slopes	12	15	60	75	55	75	3.5	5.0	3.0	4.0	3.0	3.5	2.5	3.0	2.0	2.5
Barbour and Tioga loams	15	20	75	100	60	80	4.5	6.0	4.0	5.0	3.5	4.5	3.0	3.5	2.0	2.5
Basher and Middlebury silt loams	14	18	70	90	55	70			3.0	3.0	3.0	3.5	2.5	3.0	2.0	2.5
Burdett and Erie channery silt loams, 3 to 8 percent slopes	8	10			40	50					2.0	3.0	2.0	2.5	1.5	2.0
Burdett and Erie channery silt loams, 8 to 15 percent slopes	8	10			40	50			2.0	3.0	2.0	3.0	2.0	2.5	1.5	2.0
Cattaraugus stony silt loam, 15 to 25 percent slopes					45	50			2.0	3.0	2.0	3.0	2.0	2.5	1.5	2.0
Cattaraugus stony silt loam, 25 to 35 percent slopes															1.5	2.0
Chippewa and Norwich stony silt loams, 0 to 3 percent slopes													1.5	2.5	1.0	2.0
Chippewa and Norwich stony silt loams, 3 to 15 percent slopes													1.5	2.5	1.0	2.0
Conesus channery silt loam, 2 to 10 percent slopes	12	14	60	70	50	60			3.0	3.5	3.0	3.5	2.5	3.0	2.0	2.5
Conesus channery silt loam, 10 to 20 percent slopes	12	14	60	70	50	60			3.0	3.5	3.0	3.5	2.5	3.0	2.0	2.5
Culvers stony silt loam, 2 to 8 percent slopes	10	15	50	75	45	60			2.0	3.5	2.0	3.5	2.0	3.0	1.5	2.5
Culvers stony silt loam, 8 to 15 percent slopes	10	15	50	75	45	60			2.0	3.5	2.0	3.5	2.0	3.0	1.5	2.5
Culvers stony silt loam, 15 to 25 percent slopes					45	60			2.0	3.0	2.0	3.0	2.0	2.5	1.5	2.0
Darien channery silt loam, 2 to 8 percent slopes	10	12	50	60	45	55			2.5	3.0	2.5	3.0	2.5	3.0	2.0	2.5
Darien channery silt loam, 8 to 15 percent slopes	10	12	50	60	45	55			2.5	3.0	2.5	3.0	2.5	3.0	2.0	2.5
Darien channery silty clay loam, 8 to 15 percent slopes, eroded					40	50			2.5	3.0	2.5	3.0	2.5	3.0	2.0	2.5
Darien silt loam, gently undulating, 2 to 8 percent slopes	12	15	60	75	50	60			3.0	3.5	3.0	3.5	2.5	3.0	2.0	2.5
Darien silt loam, undulating, 8 to 15 percent slopes	12	15	60	75	50	60			3.0	3.5	3.0	3.5	2.5	3.0	2.0	2.5
Darien silt loam, undulating, 15 to 25 percent slopes					45	55							2.5	3.0	2.0	2.5
Darien silt loam, 2 to 8 percent slopes	10	12	50	60	45	55			2.0	3.0	2.0	3.0	1.5	2.5	1.5	2.0
Darien silt loam, 8 to 15 percent slopes	10	12	50	60	45	55			2.0	3.0	2.0	3.0	2.0	2.5	1.5	2.0
Darien silty clay loam, 2 to 8 percent slopes, eroded	8	10	40	50	40	50			2.0	3.0	2.0	3.0	2.0	2.5	1.5	2.5
Darien silty clay loam, undulating, 8 to 15 percent slopes, eroded					40	50			2.5	3.0	2.5	3.0	2.5	3.0	2.0	2.5

See footnotes at end of table.

TABLE 1.—*Estimated average acre yields of principal crops under two levels of management*—Continued

Soil	Corn				Oats		Forage mixture									
	Silage		Grain				Alfalfa-grass [1]		Alfalfa-grass [2]		Alfalfa-birdsfoot trefoil-grass [3]		Birdsfoot trefoil-grass [4]		Birdsfoot trefoil-grass [5]	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Tons	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*
Fredon and Halsey gravelly loams	----	----	----	----	40	50	----	----	----	----	----	----	2.0	3.0	1.5	2.0
Holly and Papakating silt loams	----	----	----	----	----	----	----	----	----	----	----	----	2.0	3.0	1.5	2.0
Honeoye-Farmington complex, 2 to 10 percent slopes	10	16	50	80	50	65	3.0	4.0	2.5	3.5	2.5	3.5	2.0	3.0	2.0	2.5
Honeoye-Farmington complex, 10 to 20 percent slopes	10	14	50	70	50	65	3.0	4.0	2.5	3.5	2.5	3.5	2.0	3.0	2.0	2.5
Howard gravelly silt loam, 0 to 5 percent slopes	12	15	60	75	55	70	3.5	4.5	2.5	3.5	2.5	3.5	2.0	3.0	1.5	2.5
Howard gravelly silt loam, 5 to 15 percent slopes	12	15	60	75	55	70	3.5	4.5	2.5	3.5	2.5	3.5	2.0	3.0	1.5	2.5
Ilion and Appleton silt loams, 3 to 8 percent slopes	----	----	----	----	40	55	----	----	----	----	2.5	3.0	2.0	3.0	1.5	2.5
Ilion and Lyons silt loams, 0 to 3 percent slopes	----	----	----	----	35	45	----	----	----	----	----	----	1.5	2.5	1.0	2.0
Ilion and Lyons silt loams, 3 to 15 percent slopes	----	----	----	----	35	45	----	----	----	----	----	----	1.5	2.5	1.0	2.0
Lakemont and Madalin soils, deep, 0 to 2 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	1.5	2.5	1.0	2.0
Lakemont and Madalin silty clay loams, 2 to 6 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	1.5	2.5	1.0	2.0
Lansing channery silt loam, 2 to 10 percent slopes	10	16	50	80	55	70	3.0	4.0	2.5	3.5	2.5	3.5	2.0	3.0	2.0	2.5
Lansing channery silt loam, 10 to 20 percent slopes	10	14	50	70	50	65	3.0	4.0	2.5	3.5	2.5	3.5	2.0	3.0	2.0	2.5
Lansing channery silt loam, 10 to 20 percent slopes, eroded	8	12	40	60	40	60	----	----	2.0	3.0	2.0	3.0	2.0	2.5	1.5	2.0
Lordstown channery silt loam, 0 to 5 percent slopes	8	12	----	----	45	65	2.0	3.5	2.0	3.5	2.0	3.0	2.0	3.0	1.5	2.0
Lordstown channery silt loam, 5 to 15 percent slopes	8	12	----	----	45	65	2.0	3.5	2.0	3.5	2.0	3.0	2.0	3.0	1.5	2.0
Lordstown channery silt loam, 15 to 25 percent slopes	----	----	----	----	40	55	1.5	2.5	1.5	2.5	1.5	2.5	1.5	2.5	1.0	2.0
Lordstown silt loam, 0 to 8 percent slopes	10	12	50	60	45	65	2.0	3.5	2.0	3.5	2.0	3.0	2.0	3.0	1.5	2.0
Lyons silt loam, shallow, 0 to 8 percent slopes	----	----	----	----	35	45	----	----	----	----	----	----	1.5	2.5	1.0	2.0
Lyons and Ilion very stony soils, 0 to 8 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Madalin silt loam, over till	----	----	----	----	----	----	----	----	----	----	----	----	1.5	2.5	1.0	2.0
Mardin channery silt loam, 2 to 8 percent slopes	10	15	50	75	45	60	----	----	2.0	3.5	2.0	3.5	2.0	3.0	1.5	2.5
Mardin channery silt loam, 8 to 15 percent slopes	8	12	40	60	45	60	----	----	2.0	3.5	2.0	3.5	2.0	3.0	1.5	2.5
Mardin channery silt loam, 8 to 15 percent slopes, eroded	8	10	----	----	40	55	----	----	2.0	3.0	2.0	3.0	1.5	2.5	1.0	2.0
Mardin channery silt loam, 15 to 25 percent slopes	----	----	----	----	45	60	----	----	2.0	3.5	2.0	3.5	2.0	3.5	2.0	2.5
Mardin channery silt loam, 25 to 35 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.5	2.0
Mohawk and Honeoye silt loams, 10 to 20 percent slopes	12	18	60	90	50	70	3.5	4.5	3.0	4.0	3.0	4.0	2.5	3.0	2.0	2.5
Mohawk and Honeoye silt loams, 10 to 20 percent slopes, eroded	8	12	40	60	40	60	3.0	4.0	2.5	3.5	2.5	3.5	2.5	3.0	2.0	2.5
Mohawk and Honeoye silt loams, 20 to 30 percent slopes	----	----	----	----	40	60	----	----	2.5	3.5	2.5	3.5	2.5	3.0	2.0	2.5
Mohawk and Lima silt loams, 2 to 10 percent slopes	15	20	75	100	55	75	3.5	4.5	3.0	4.0	3.0	4.0	2.5	3.0	2.0	2.5
Mohawk and Lima silt loams, 2 to 10 percent slopes, eroded	10	12	50	60	45	65	3.5	4.5	3.0	4.0	3.0	3.5	2.5	3.0	2.0	2.5
Morris stony silt loam, 2 to 8 percent slopes	7	10	----	----	35	45	----	----	----	----	2.0	3.0	1.5	2.5	1.5	2.0
Morris stony silt loam, 8 to 15 percent slopes	7	10	----	----	35	45	----	----	----	----	2.0	3.0	1.5	2.5	1.5	2.0
Nassau shaly silt loam, 2 to 15 percent slopes	8	10	----	----	40	50	2.0	3.0	2.0	3.0	2.0	2.5	1.5	2.0	1.0	2.0
Nassau shaly silt loam, 15 to 35 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.5	2.0

See footnotes at end of table.

TABLE 1.—*Estimated average acre yields of principal crops under two levels of management*—Continued

Soil	Corn				Oats		Forage mixture									
	Silage		Grain				Alfalfa-grass [1]		Alfalfa-grass [2]		Alfalfa-birdsfoot trefoil-grass [3]		Birdsfoot trefoil-grass [4]		Birdsfoot trefoil-grass [5]	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Tons	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*
Nunda channery silt loam, 3 to 10 percent slopes	10	15	50	75	50	60	----	----	2.5	3.5	2.5	3.5	2.0	3.0	1.5	2.5
Nunda channery silt loam, 10 to 20 percent slopes	10	15	40	65	50	60	----	----	2.5	3.5	2.5	3.5	2.0	3.0	1.5	2.5
Nunda channery silt loam, 10 to 20 percent slopes, eroded	----	----	----	----	40	50	----	----	----	----	2.0	3.0	2.0	3.0	1.0	2.0
Nunda channery silt loam, 20 to 30 percent slopes	----	----	----	----	45	55	----	----	----	----	----	----	2.0	3.0	1.5	2.5
Nunda channery silt loam, 20 to 30 percent slopes, eroded	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.0	2.0
Nunda and Langford channery silt loams, 3 to 8 percent slopes	10	12	50	60	50	60	----	----	2.5	3.5	2.5	3.5	2.0	3.0	1.5	2.5
Nunda and Langford channery silt loams, 8 to 15 percent slopes	10	12	50	60	50	60	----	----	2.5	3.5	2.5	3.5	2.0	3.0	1.5	2.5
Nunda and Langford channery silt loams, 8 to 15 percent slopes, eroded	8	10	40	50	45	55	----	----	2.5	3.0	2.5	3.0	2.0	3.0	1.5	2.5
Nunda and Langford channery silt loams, 15 to 25 percent slopes	----	----	----	----	45	55	----	----	----	----	2.0	3.0	2.0	3.0	1.5	2.0
Odessa and Rhinebeck silt loams, 0 to 2 percent slopes	10	14	50	70	40	50	----	----	2.0	3.0	2.0	3.0	2.0	2.5	1.0	2.0
Odessa and Rhinebeck silt loams, 2 to 6 percent slopes	10	14	50	70	40	50	----	----	2.0	3.0	2.0	3.0	2.0	2.5	1.0	2.0
Odessa and Rhinebeck silt loams, 6 to 12 percent slopes	10	14	50	70	40	50	----	----	2.0	3.0	2.0	3.0	2.0	2.5	1.0	2.0
Odessa and Rhinebeck silty clay loams, 6 to 12 percent slopes, eroded	----	----	----	----	35	45	----	----	2.0	3.0	2.0	3.0	2.0	2.5	1.0	2.0
Oquaga stony silt loam, 3 to 15 percent slopes	8	12	40	60	45	65	2.0	3.5	2.0	3.5	2.0	3.0	3.0	3.0	1.5	2.0
Oquaga stony silt loam, 15 to 25 percent slopes	----	----	----	----	40	55	----	----	2.0	3.5	2.0	3.0	2.0	3.0	1.5	2.0
Oquaga stony silt loam, 25 to 35 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	2.0	2.5	1.5	2.0
Phelps gravelly silt loam, 0 to 5 percent slopes	10	12	50	60	40	55	----	----	2.5	3.5	2.0	3.5	2.0	3.0	2.0	2.5
Phelps gravelly silt loam, clay substratum, 2 to 8 percent slopes	10	12	50	60	40	55	----	----	2.0	3.5	2.0	3.5	2.0	3.0	2.0	2.5
Red Hook gravelly silt loam	----	----	----	----	40	50	----	----	----	----	2.5	3.0	2.0	3.0	1.5	2.0
Schoharie and Hudson silt loams, 2 to 6 percent slopes	10	15	50	75	50	60	2.5	4.0	2.5	3.5	2.5	3.5	2.0	3.0	2.0	2.5
Schoharie and Hudson silt loams, 6 to 12 percent slopes	10	15	50	75	50	60	2.5	4.0	2.5	3.5	2.5	3.5	2.0	3.0	2.0	2.5
Schoharie and Hudson silty clay loams, 2 to 6 percent slopes, eroded	8	10	40	50	45	55	2.5	4.0	2.5	3.5	2.5	3.5	2.0	3.0	2.0	2.5
Schoharie and Hudson silty clay loams, 6 to 12 percent slopes, eroded	8	10	40	50	45	55	----	----	2.0	3.5	2.0	3.5	2.0	3.0	2.0	2.5
Schoharie and Hudson silty clay loams, 12 to 20 percent slopes, eroded	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.0	2.0
Scio silt loam, 0 to 3 percent slopes	10	12	50	60	50	60	----	----	2.5	3.5	2.0	3.5	2.0	3.0	1.5	2.0
Tuller and Allis silt loams, 0 to 8 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	1.5	2.5	1.0	2.0
Tuller and Allis silt loams, 8 to 15 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	1.5	2.5	1.0	2.0
Tunkhannock and Chenango gravelly loams, fans, 0 to 5 percent slopes	12	15	60	75	55	70	3.0	5.0	3.0	4.0	2.5	3.5	2.0	3.0	2.0	2.5
Tunkhannock and Chenango gravelly loams, fans, 5 to 15 percent slopes	10	12	50	60	50	65	3.0	5.0	3.0	4.0	2.5	3.5	2.0	3.0	2.0	2.5
Tunkhannock and Chenango gravelly silt loams, 0 to 5 percent simple slopes	12	15	60	75	55	70	3.0	5.0	3.0	4.0	2.5	3.5	2.0	3.0	2.0	2.5
Tunkhannock and Chenango gravelly silt loams, 5 to 15 percent simple slopes	10	12	50	60	50	65	2.5	5.0	2.0	4.0	2.5	3.5	2.0	3.0	2.0	2.5
Tunkhannock and Chenango gravelly silt loams, 3 to 15 percent complex slopes	10	12	50	60	50	65	2.5	5.0	2.0	3.5	2.5	3.5	2.0	3.0	2.0	2.5

See footnotes at end of table.

TABLE 1.—*Estimated average acre yields of principal crops under two levels of management*—Continued

Soil	Corn				Oats		Forage mixture									
	Silage		Grain				Alfalfa-grass [1]		Alfalfa-grass [2]		Alfalfa-birdsfoot trefoil-grass [3]		Birdsfoot trefoil-grass [4]		Birdsfoot trefoil-grass [5]	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Tons	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*
Tunkhannock and Chenango gravelly silt loams, 15 to 25 percent slopes	----	----	----	----	40	45	----	----	2.0	3.5	2.5	3.5	2.0	3.0	2.0	2.5
Tunkhannock and Chenango soils, nonstratified, 3 to 15 percent slopes	10	12	50	60	45	50	2.5	4.0	2.0	4.0	2.5	3.5	2.0	3.0	2.0	2.5
Tunkhannock and Chenango soils, nonstratified, 15 to 35 percent slopes	----	----	----	----	40	45	----	----	2.0	3.5	2.5	3.5	2.0	3.0	2.0	2.5
Tunkhannock cobbly sandy loam, 0 to 5 percent slopes	7	10	----	----	40	45	3.0	3.5	3.0	----	2.0	3.0	1.5	2.0	1.5	2.0
Volusia channery silt loam, 0 to 3 percent slopes	7	10	----	----	35	45	----	----	----	----	2.0	3.0	1.5	2.5	1.5	2.0
Volusia channery silt loam, 3 to 8 percent slopes	7	10	----	----	35	45	----	----	----	----	2.0	3.0	1.5	2.5	1.5	2.0
Volusia channery silt loam, 8 to 15 percent slopes	7	10	----	----	35	45	----	----	----	----	2.0	3.0	1.5	2.5	1.5	2.0
Wayland silt loam	----	----	----	----	----	----	----	----	----	----	----	----	1.5	2.5	1.0	2.0

[1] Du Puits or Cayuga alfalfa mixed with smooth bromegrass.
[2] Narragansett or Vernal alfalfa mixed with timothy or smooth bromegrass.
[3] Narragansett alfalfa and Viking or Mansfield birdsfoot trefoil mixed with timothy.
[4] Viking or Mansfield birdsfoot trefoil mixed with timothy.
[5] Empire birdsfoot trefoil mixed with timothy.

Potential productivity.—Potential productivity is the growth that may be expected for an important tree species or a forest cover type on a soil under a specified kind of management. In table 2 the potential productivity of the soils in each group is rated good, fair, and poor for the production of wood crops under good management. Soils rated *good* produce rapid growth; *fair*, fairly rapid growth; and *poor*, slow growth. Soils that have a rating of poor generally are planted only to very hardy trees and shrubs that are needed to control erosion or to provide food and cover for wildlife.

The limitations and hazards rated in table 2 are seedling mortality, plant competition, equipment limitation, erosion hazard, and windthrow hazard.

Seedling mortality.—This refers to the expected loss of seedlings as a result of unfavorable soil characteristics or topographic features, not as a result of plant competition. Even if healthy plants are correctly planted or occur naturally in adequate numbers, some will not survive if conditions are unfavorable. *Slight* mortality is the loss of less than 25 percent of the seedlings; *moderate*, between 25 and 50 percent; and *severe*, more than 50 percent.

Plant competition.—This refers to the rate of invasion by unwanted trees, shrubs, and vines when openings are made in the canopy. Competition is *slight* if it does not prevent adequate establishment of a desirable stand of trees. Competition is *moderate* if it delays the establishment and slows the growth of seedlings, either naturally occurring or planted, but does not prevent the eventual development of a fully stocked, normal stand. Competition is *severe* if it prevents adequate restocking, either natural or artificial, without intensive preparation of the site and special maintenance practices.

Equipment limitations.—Some soil characteristics and topographic features restrict or prohibit the use of conventional equipment for planting and harvesting wood crops, for constructing roads, for controlling unwanted vegetation, and for controlling fires. The limitation is *slight* if there is little or no restriction on the type of equipment that can be used or the time of year that equipment can be used. The limitation is *moderate* if the use of equipment is restricted by one or more unfavorable soil characteristics. The limitation is *severe* if special equipment is needed, or the use of such equipment is severely restricted by one or more unfavorable soil characteristics.

Erosion hazard.—This indicates the degree of potential erosion on the soil under common woodland management. The ratings are as follows: *Slight*, no special problems; *moderate*, some care is needed in locating roads and skid trails; *severe*, extreme care is needed in locating roads, skid trails, loading areas, and other areas of operation, and in the use of methods that minimize soil erosion.

Windthrow hazard.—The ratings for windthrow hazard are based on an evaluation of soil characteristics that control the development of tree roots and thus affect windfirmness. A rating of *slight* indicates no special problem. A rating of *moderate* indicates that root development is adequate except during periods of excessive wetness and greatest wind velocity. A rating of *severe* indicates that root depth does not give adequate stability.

TABLE 2.—*Management data*

Woodland suitability group [1]	Limitations and hazards		
	Potential productivity	Seedling mortality	Plant competition
Group 1: Well drained and moderately well drained, mainly medium-textured, medium- and high-lime soils on low plateau areas of the uplands and on valley sides; slopes range mainly from 2 to 30 percent but in a few places are as much as 50 percent; substratum of soils on low plateaus is firm, calcareous glacial till and of soils in the valleys is layered silt and clay.	Good	Slight	Moderate
Group 2: Deep, well drained and moderately well drained, medium-textured and moderately coarse textured soils on slightly acid to very strongly acid, gravelly, and sandy glacial outwash and silty alluvium; slopes mainly range from 0 to 15 percent but are as much as 35 percent in places.	Good	Slight	Slight to moderate.
Group 3: Well drained and moderately well drained, channery and stony, medium-textured, strongly acid soils on high plateau areas of the uplands; slopes range mainly from 0 to 25 percent but in places are as much as 35 percent; a firm fragipan or bedrock is between a depth of 18 and 30 inches.	Fair to good	Moderate	Slight to moderate.
Group 4: Well-drained, stony and channery, strongly acid, medium-textured soils on high plateau areas of the uplands; slopes range mainly from 25 to 35 percent but in places are as much as 70 percent; a fragipan is at a depth of 24 to 30 inches and bedrock is shallow to moderately deep in places.	Good	Moderate	Slight
Group 5: Somewhat poorly drained, medium-textured, medium- and high-lime soils on low plateau areas of the uplands and on valley sides; slopes range from 0 to 15 percent; substratum of soils on low plateau areas is firm, calcareous glacial till and of soils in the valleys is layered silt and clay.	Fair to good	Moderate	Moderate
Group 6: Eroded, somewhat poorly drained, moderately fine textured soils on low plateau areas of the uplands and on valley sides; slopes range from 2 to 15 percent; except for erosion and less depth to free lime, these soils are similar to the soils in group 5.	Poor to fair	Moderate	Moderate
Group 7: Somewhat poorly drained, strongly acid channery and stony, medium-textured soils of the uplands, mainly on high plateau areas; slopes range from 0 to 15 percent; a firm fragipan is at a depth of 12 to 15 inches.	Fair	Moderate	Moderate
Group 8: Deep to shallow, poorly drained and very poorly drained, medium-textured and moderately fine textured, limy soils on low plateau areas of the uplands and on valley sides; slopes range mainly from 0 to 8 percent but in places are as much as 15 percent.	Poor to fair	Moderate	Severe
Group 9: Somewhat excessively drained, flaggy, rocky, stony, and shaly, medium-textured soils that are strongly acid to medium acid and are in the uplands; slopes range from 0 to 35 percent; bedrock in most places is at a depth of less than 20 inches and commonly crops out.	Poor	Moderate	Slight
Group 10: Poorly drained and very poorly drained, medium-textured, strongly acid soils on high plateau areas of the uplands; stony in places; slopes range from 0 to 15 percent; shallow to a firm fragipan or to bedrock.	Poor	Moderate	Moderate to severe.

[1] Because they are mainly not suitable as commercial woodland or not enough data were available, the following soils were not placed in woodland suitability groups: Alluvial land (Al); Farmington very rocky silt loam, 10 to 70 percent slopes (FaF); Holly and Papakating silt loams (Ha); Muck, slightly acid (Ms); Muck and Peat, strongly acid (Mu); Schoharie soils, 20 to 40 percent slopes (SoE); Tunkhannock

for woodland suitability groups

Limitations and hazards—Continued			Species suitable to—	
Equipment limitation	Erosion hazard	Windthrow hazard	Use for planting	Favor in stand
Slight for slopes of 2 to 30 percent; severe for slopes of 30 to 50 percent.	Slight to moderate for slopes of 2 to 30 percent; severe for slopes of 30 to 50 percent.	Slight	Scotch pine, white pine, European larch, Japanese larch, Norway spruce, white spruce, white-cedar, and redcedar; red pine has limited suitability.	Sugar maple, yellow birch, beech basswood, white ash, black cherry, hickory, red oak, hemlock, and white pine.
Slight	Slight	Slight	Scotch pine, red pine, white pine, European larch, Japanese larch, Norway spruce, white spruce, and redcedar; white-cedar has limited suitability.	Sugar maple, yellow birch, beech, red maple, white ash, black cherry, basswood, hemlock, white pine, and aspen.
Slight to moderate	Slight	Slight to moderate.	Scotch pine, red pine, white pine, European larch, Japanese larch, Norway spruce, white spruce, and redcedar; white-cedar has limited suitability.	Sugar maple, beech, red maple, hickory, white pine, white birch, red spruce, balsam fir, black cherry, and hemlock.
Moderate to severe	Moderate to severe.	Slight	Scotch pine, red pine, white pine, European larch, Japanese larch, and redcedar; white spruce, red spruce, and white-cedar have limited suitability.	Sugar maple, red maple, beech, hickory, white pine, white birch, black cherry, and hemlock.
Moderate	Slight	Slight	Japanese larch, European larch, Norway spruce, white spruce, and white-cedar; Scotch pine and white pine have limited suitability.	Sugar maple, red maple, basswood, white pine, hemlock, white ash, black cherry, and aspen.
Moderate	Moderate	Moderate to severe.	No species are fully suitable; Scotch pine, white pine, European larch, Japanese larch, Norway spruce, and white spruce have limited suitability.	Sugar maple, red maple, basswood, white pine, hemlock, white ash, black cherry, and aspen.
Moderate	Slight to moderate	Moderate to severe.	Norway spruce and white spruce; Scotch pine, white pine, European larch, and Japanese larch have limited suitability.	Sugar maple, red maple, basswood, white pine, and hemlock.
Severe	Slight	Severe	No species is fully suitable; Scotch pine, white pine, European larch, Japanese larch, Norway spruce, and white spruce have limited suitability.	Red maple, hemlock, white ash, oak, and white pine.
Slight to moderate	Slight	Moderate	No species is fully suitable; Scotch pine, white pine, European larch and redcedar have limited suitability; red pine has limited suitability except on Farmington very rocky silt loam, 0 to 10 percent slopes.	Red maple, white ash, hemlock, oak, beech, and white pine.
Moderate to severe	Slight	Severe	No species is fully suitable; white pine, Japanese larch, Norway spruce, and white spruce have limited suitability.	Red maple, hemlock, and white pine.

and Chenango soils, 25 to 60 percent slopes (TnF); Tunkhannock cobbly sandy loam, 0 to 5 percent slopes (TuA); and Wayland silt loam (Wa).

Wildlife [7]

Fish and wildlife are important natural resources in Schoharie County. White-tailed deer, ruffed grouse, squirrel, and cottontail rabbit are the dominant wildlife species, but wild turkey, snowshoe hare, and pheasant also occur in limited numbers.

The welfare of any wildlife species depends on the amount and adequate distribution of food, shelter, and water. If any of these habitat elements is missing, inadequate, or inaccessible, the species will be absent or scarce. The kinds of wildlife that live in a given area and the number of each kind are closely related to land use, to the resulting kind, amount, and pattern of vegetation, and to the supply and distribution of water. These, in turn, are generally related to the kinds of soils.

Most habitats managed for wildlife are created or improved by planting suitable vegetation, by properly managing the existing vegetation, by inducing desirable plants to reseed naturally, or by combining some of these measures. Suitable plants for different kinds of habitat are listed elsewhere in this subsection.

In table 3 the suitability of the soils of Schoharie County are rated for eight elements of wildlife habitat and for three classes of wildlife. In the following paragraphs these ratings and their use are explained and the habitat elements and classes of wildlife are discussed. For more detailed explanation of the rating system, refer to a publication by Allen, Garland, and Dugan (*1*).

[7] By Robert E. Myers, wildlife biologist, Soil Conservation Service, Syracuse, New York.

TABLE 3.—*Suitability of soils for wildlife habitat elements and classes of wildlife*

[Soils rated 1 are well suited; 2, suited; 3, poorly suited; and 4, unsuited]

Soil name [1]	Wildlife habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood plants	onif-erous wildlife habitat	Wetland food and cover plants	Shallow water developments [2]	Excavated impoundments [2]	Classes of wildlife: Openland wildlife	Woodland wildlife	Wetland wildlife
Appleton channery silt loam, 2 to 8 percent slopes	2	2	1	1	3	3	4	4	1	2	4
Arnot flaggy silt loam, 0 to 15 percent slopes	3	3	3	3	3	4	4	4	3	3	4
Barbour and Tioga fine sandy loams	1	1	1	1	3	4	4	4	1	1	4
Barbour and Tioga gravelly loams, fans, 0 to 8 percent slopes	1	1	1	1	3	4	4	4	1	1	4
Barbour and Tioga loams	1	1	1	1	3	4	4	4	1	1	4
Basher and Middlebury silt loams	2	1	1	1	3	3	3	3	1	1	3
Burdett and Erie channery silt loams, 3 to 8 percent slopes:											
Burdett soil	2	2	1	1	3	3	4	4	1	2	4
Erie soil	3	3	2	2	3	3	4	4	3	2	4
Burdett and Erie channery silt loams, 8 to 15 percent slopes:											
Burdett soil	2	2	1	1	3	4	4	4	1	2	4
Erie soil	3	3	2	2	3	4	4	4	3	2	4
Cattaraugus stony silt loam, 15 to 25 percent slopes	3	2	1	1	3	4	4	4	2	2	4
Cattaraugus stony silt loam, 25 to 35 percent slopes	4	3	1	1	3	4	4	4	3	2	4
Chippewa and Norwich stony silt loams, 0 to 3 percent slopes	3	3	2	2	2	1	1	1	3	2	1
Chippewa and Norwich stony silt loams, 3 to 15 percent slopes	3	3	2	2	2	3	4	4	3	2	4
Chippewa and Norwich very stony soils, 0 to 15 percent slopes	4	3	2	2	2	3	4	4	3	2	4
Conesus channery silt loam, 2 to 10 percent slopes	2	1	1	1	3	4	4	4	1	1	4
Conesus channery silt loam, 10 to 20 percent slopes	2	1	1	1	3	4	4	4	1	1	4
Culvers stony silt loam, 2 to 8 percent slopes	3	3	2	2	2	4	4	4	3	2	4
Culvers stony silt loam, 8 to 15 percent slopes	3	3	2	2	2	4	4	4	3	2	4
Culvers stony silt loam, 15 to 25 percent slopes	3	3	2	2	2	4	4	4	3	2	4
Darien channery silt loam, 2 to 8 percent slopes	2	2	1	1	3	3	4	4	2	1	4
Darien channery silt loam, 8 to 15 percent slopes	2	2	1	1	3	4	4	4	2	1	4
Darien channery silty clay loam, 8 to 15 percent slopes, eroded	3	3	1	1	2	4	4	4	2	1	4

See footnotes at end of table.

TABLE 3.—*Suitability of soils for wildlife habitat elements and classes of wildlife*—Continued

Soil name [1]	Wildlife habitat elements								Classes of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood plants	Coniferous wildlife habitat	Wetland food and cover plants	Shallow water developments [2]	Excavated impoundments [2]	Openland wildlife	Woodland wildlife	Wetland wildlife
Darien silt loam, gently undulating, 2 to 8 percent slopes	2	1	1	1	3	4	4	4	1	1	4
Darien silt loam, undulating, 8 to 15 per. ent slopes	2	1	1	1	3	4	4	4	1	1	4
Darien silt loam, undulating, 15 to 25 percent slopes	3	2	1	1	3	4	4	4	2	2	4
Darien silt loam, 2 to 8 percent slopes	2	2	1	1	3	3	4	4	1	2	4
Darien silt loam, 8 to 15 percent slopes	2	2	1	1	3	4	4	4	1	2	4
Darien silty clay loam, 2 to 8 percent slopes, eroded	2	2	1	1	3	3	4	4	1	2	4
Darien silty clay loam, undulating, 8 to 15 percent slopes, eroded	3	2	1	1	3	4	4	4	2	2	4
Farmington very rocky silt loam, 0 to 10 percent slopes	4	4	3	3	2	4	4	4	4	3	4
Farmington very rocky silt loam, 10 to 70 percent slopes	4	4	3	3	2	4	4	4	4	3	4
Fredon and Halsey gravelly loams:											
Fredon soil	3	2	2	2	2	1	2	2	2	2	1
Halsey soil	4	3	3	3	1	1	1	1	4	3	1
Holly and Papakating silt loams:											
Holly soil	3	2	2	2	2	1	2	3	2	2	1
Papakating soil	4	3	3	3	1	1	2	3	4	3	1
Honeoye-Farmington complex, 2 to 10 percent slopes:											
Honeoye soil	2	1	1	1	3	4	4	4	1	1	4
Farmington soil	3	3	2	2	3	4	4	4	3	3	4
Honeoye-Farmington complex, 10 to 20 percent slopes:											
Honeoye soil	3	2	1	1	3	4	4	4	2	2	4
Farmington soil	3	3	2	2	3	4	4	4	3	3	4
Howard gravelly silt loam, 0 to 5 percent slopes	1	1	1	1	3	4	4	4	1	1	4
Howard gravelly silt loam, 5 to 15 percent slopes	2	1	1	1	3	4	4	4	1	1	4
Ilion and Appleton silt loams, 3 to 8 percent slopes:											
Ilion soil	3	2	2	1	2	3	4	4	2	1	4
Appleton soil	2	2	1	1	3	3	4	4	1	2	4
Ilion and Lyons silt loams, 0 to 3 percent slopes	3	2	2	2	2	1	1	1	2	2	1
Ilion and Lyons silt loams, 3 to 15 percent slopes	3	3	2	2	2	3	4	4	3	2	4
Lakemont and Madalin soils, deep, 0 to 2 percent slopes	4	3	3	3	1	1	2	3	4	3	1
Lakemont and Madalin silty clay loams, 2 to 6 percent slopes	4	3	3	3	1	3	4	4	4	3	4
Lansing channery silt loam, 2 to 10 percent slopes	2	1	1	1	3	4	4	3	1	1	4
Lansing channery silt loam, 10 to 20 percent slopes	3	2	1	1	3	4	4	4	2	2	4
Lansing channery silt loam, 10 to 20 percent slopes, eroded	4	3	1	1	3	4	4	4	3	2	4
Lordstown channery silt loam, 0 to 5 percent slopes	2	1	1	1	3	4	4	4	1	1	4
Lordstown channery silt loam, 5 to 15 percent	2	1	1	1	3	4	4	4	1	1	4
Lordstown channery silt loam, 15 to 25 percent slopes	3	2	1	1	3	4	4	4	2	2	4
Lordstown channery silt loam, 25 to 35 percent slopes	4	3	2	2	3	4	4	4	3	3	4
Lordstown silt loam, 0 to 8 percent slopes	2	1	1	1	3	4	4	4	1	1	4
Lordstown and Oquaga very stony soils, 0 to 35 percent slopes	4	3	1	1	2	4	4	4	3	1	4
Lordstown, Oquaga and Nassau soils, 35 to 70 percent slopes	4	4	1	1	3	4	4	4	3	2	4
Lyons silt loam, shallow, 0 to 8 percent slopes	4	3	3	3	1	2	3	4	4	3	3

See footnotes at end of table.

TABLE 3.—*Suitability of soils for wildlife habitat elements and classes of wildlife*—Continued

Soil name [1]	Wildlife habitat elements								Classes of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood plants	Coniferous wildlife habitat	Wetland food and cover plants	Shallow water developments [2]	Excavated impoundments [2]	Openland wildlife	Woodland wildlife	Wetland wildlife
Lyons and Ilion very stony soils, 0 to 8 percent slopes	4	3	3	3	1	2	3	3	4	3	3
Madalin silt loam, over till	4	3	3	3	1	2	1	1	4	3	1
Mardin channery silt loam, 2 to 8 percent slopes	2	2	1	1	3	4	4	4	1	2	4
Mardin channery silt loam, 8 to 15 percent slopes	2	2	1	1	3	4	4	4	1	2	4
Mardin channery silt loam, 8 to 15 percent slopes, eroded	3	3	1	1	3	4	4	4	2	2	4
Mardin channery silt loam, 15 to 25 percent slopes	3	3	1	1	3	4	4	4	2	2	4
Mardin channery silt loam, 25 to 35 percent slopes	4	3	1	1	3	4	4	4	3	2	4
Mardin and Cattaraugus soils, 35 to 70 percent slopes	4	4	1	1	3	4	4	4	3	2	4
Mardin and Culvers very stony soils, 0 to 35 percent slopes	4	3	1	1	2	4	4	4	3	1	4
Mohawk and Honeoye silt loams, 10 to 20 percent slopes	3	2	1	1	3	4	4	4	2	2	4
Mohawk and Honeoye silt loams, 10 to 20 percent slopes, eroded	4	3	1	1	3	4	4	4	3	2	4
Mohawk and Honeoye silt loams, 20 to 30 percent slopes	4	3	1	1	3	4	4	4	3	2	4
Mohawk and Honeoye soils, 30 to 50 percent slopes	4	4	1	1	3	4	4	4	3	2	4
Mohawk and Lansing very stony silt loams, 3 to 20 percent slopes	4	3	1	1	2	4	4	4	3	1	4
Mohawk and Lansing very stony silt loams, 20 to 30 percent slopes	4	3	1	1	2	4	4	4	3	1	4
Mohawk and Lima silt loams, 2 to 10 percent slopes	2	1	1	1	3	4	4	4	1	1	4
Mohawk and Lima silt loams, 2 to 10 percent slopes, eroded	3	2	1	1	3	4	4	4	2	2	4
Morris stony silt loam, 2 to 8 percent slopes	3	3	1	2	2	3	4	4	2	2	4
Morris stony silt loam, 8 to 15 percent slopes	3	3	1	2	2	4	4	4	2	2	4
Muck, slightly acid	4	3	4	4	1	2	1	1	4	4	1
Muck and Peat, strongly acid	4	3	4	4	1	2	1	1	4	4	1
Nassau shaly silt loam, 2 to 15 percent slopes	3	3	2	2	3	4	4	4	3	3	4
Nassau shaly silt loam, 15 to 35 percent slopes	3	3	2	2	3	4	4	4	3	3	4
Nunda channery silt loam, 3 to 10 percent slopes	2	1	1	1	3	4	4	4	1	1	4
Nunda channery silt loam, 10 to 20 percent slopes	3	2	1	1	3	4	4	4	2	2	4
Nunda channery silt loam, 10 to 20 percent clopes, eroded	4	3	1	1	3	4	4	4	3	2	4
Nunda channery silt loam, 20 to 30 percent slopes	4	3	1	1	3	4	4	4	3	2	4
Nunda channery silt loam, 20 to 30 percent slopes, eroded	4	4	1	1	3	4	4	4	3	2	4
Nunda and Langford channery silt loams, 3 to 8 percent slopes	2	1	1	1	3	3	4	4	1	1	4
Nunda and Langford channery silt loams, 8 to 15 percent slopes	2	1	1	1	3	4	4	4	1	1	4
Nunda and Langford channery silt loams, 8 to 15 percent slopes, eroded	3	2	1	1	3	4	4	4	2	2	4
Nunda and Langford channery silt loams, 15 to 25 percent slopes	3	2	1	1	3	4	4	4	2	2	1
Odessa and Rhinebeck silt loams, 0 to 2 percent slopes	2	2	1	1	3	2	2	2	1	2	4
Odessa and Rhinebeck silt loams, 2 to 6 percent slopes	2	2	1	1	3	3	4	4	1	2	4
Odessa and Rhinebeck silt loams, 6 to 12 percent slopes	2	2	1	1	3	4	4	4	1	2	4

See footnotes at end of table.

TABLE 3.—*Suitability of soils for wildlife habitat elements and classes of wildlife*—Continued

Soil name [1]	Wildlife habitat elements								Classes of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood plants	Coniferous wildlife habitat	Wetland food and cover plants	Shallow water developments [2]	Excavated impoundments [2]	Openland wildlife	Woodland wildlife	Wetland wildlife
Odessa and Rhinebeck silty clay loams, 6 to 12 percent slopes, eroded	3	3	1	1	3	4	4	4	2	2	4
Oquaga stony silt loam, 3 to 15 percent slopes	3	2	1	1	3	4	4	4	2	2	4
Oquaga stony silt loam, 15 to 25 percent slopes	3	2	1	1	3	4	4	4	2	2	4
Oquaga stony silt loam, 25 to 35 percent slopes	4	3	1	1	3	4	4	4	3	2	4
Phelps gravelly silt loam, 0 to 5 percent slopes	2	1	1	1	3	3	3	3	1	1	3
Phelps gravelly silt loam, clay substratum, 2 to 8 percent slopes	2	1	1	1	3	4	4	4	1	1	4
Red Hook gravelly silt loam	2	2	1	1	3	2	2	2	1	2	1
Scio silt loam, 0 to 3 percent slopes	2	1	1	1	3	3	3	3	1	1	3
Schoharie and Hudson silt loams, 2 to 6 percent slopes	2	1	1	1	3	4	4	4	1	1	4
Schoharie and Hudson silt loams, 6 to 12 percent slopes	2	1	1	1	3	4	4	4	1	1	4
Schoharie and Hudson silty clay loams, 2 to 6 percent slopes, eroded	3	2	1	1	3	4	4	4	2	2	4
Schoharie and Hudson silty clay loams, 6 to 12 percent slopes, eroded	3	2	1	1	3	4	4	4	2	2	4
Schoharie and Hudson silty clay loams, 12 to 20 percent slopes, eroded	4	3	1	1	3	4	4	4	3	2	4
Schoharie soils, 20 to 40 percent slopes	4	4	1	1	3	4	4	4	3	2	
Tuller and Allis silt loams, 0 to 8 percent slopes	3	3	2	2	2	3	4	4	3	2	4
Tuller and Allis silt loams, 8 to 15 percent slopes	3	3	2	2	2	4	4	4	3	2	4
Tunkhannock and Chenango gravelly loams, fans, 0 to 5 percent slopes	1	1	1	1	3	4	4	4	1	1	4
Tunkhannock and Chenango gravelly loams, fans, 5 to 15 percent slopes	2	1	1	1	3	4	4	4	1	1	4
Tunkhannock and Chenango gravelly silt loams, 0 to 5 percent simple slopes	1	1	1	1	3	4	4	4	1	1	4
Tunkhannock and Chenango gravelly silt loams, 5 to 15 percent simple slopes	2	1	1	1	3	4	4	4	1	1	4
Tunkhannock and Chenango gravelly silt loams, 3 to 15 percent complex slopes	2	1	1	1	3	4	4	4	1	1	4
Tunkhannock and Chenango gravelly silt loams, 15 to 25 percent slopes	3	2	1	1	3	4	4	4	2	2	4
Tunkhannock and Chenango soils, nonstratified, 3 to 15 percent slopes	2	1	1	1	3	4	4	4	1	1	4
Tunkhannock and Chenango soils, nonstratified, 15 to 35 percent slopes	4	3	1	1	3	4	4	4	3	2	4
Tunkhannock and Chenango soils, 25 to 60 percent slopes	4	4	2	1	3	4	4	4	3	2	4
Tunkhannock cobbly sandy loam, 0 to 5 percent slopes	2	2	2	1	3	4	4	4	2	2	4
Volusia channery silt loam, 0 to 3 percent slopes	3	3	2	2	3	2	2	2	3	3	2
Volusia channery silt loam, 3 to 8 percent slopes	3	3	2	2	3	3	4	4	3	3	4
Volusia channery silt loam, 8 to 15 percent slopes	3	3	2	2	3	4	4	4	3	3	4
Volusia, Morris and Erie very stony soils, 0 to 15 percent slopes	4	3	2	2	3	3	4	4	3	2	4
Wayland silt loam	3	2	2	1	2	1	2	3	2	1	1

[1] Alluvial land is not rated, because its characteristics are too variable.

[2] Detailed investigation at the site of the proposed construction is needed to determine feasibility. Features of each soil that affect reservoir areas and embankments of farm ponds are listed in table 6 of the subsection "Engineering Applications."

Ratings of the suitability of each soil for the wildlife habitat elements and classes of wildlife are given in table 3. A rating of 1 means that the soil is *well suited* or has few or no limitations to the habitat element or the kind of wildlife. A rating of 2 means that the soil is *suited* and that the habitat can be created, improved, or maintained for the kind of wildlife because the limitation is only moderate. Soils rated 3 are *poorly suited* and have fairly severe limitations that possibly can be overcome. Soils rated 4 are *unsuited*, and providing a satisfactory habitat for the specified kind of wildlife is not practical.

These suitability ratings can be used as an aid in—

1. Planning broad uses of land for parks, wildlife refuges, areas developed for wildlife and used for recreation, and nature-study areas.
2. Determining suitability of areas to be purchased for wildlife use.
3. Selecting the more suitable sites for creating, improving, or maintaining specific kinds of wildlife habitat elements.
4. Determining the intensity of management needed to maintain each habitat element.
5. Avoiding sites that are difficult or are not feasible to manage for specific kinds of wildlife.

Wildlife habitat elements

The suitability of each soil is rated in table 3 for eight kinds of habitat elements in the county. These elements are defined as follows:

Grain and seed crops.—These crops include such seed-producing annuals as corn, sorghum, wheat, barley, oats, millet, buckwheat, and sunflower. Soils well suited to these plants are deep, nearly level or very gently sloping, medium textured, well drained, and free or nearly free of stones. They have high moisture-holding capacity and are not subject to frequent flooding. These soils can be safely planted to these grain crops each year, but the ones that are not so well suited require more intensive management and fewer crops are suitable for planting.

Grasses and legumes.—Making up this group are domestic grasses and legumes that are established by planting. Among these plants are bluegrass, switchgrass, fescue, bromegrass, timothy, orchardgrass, reed canarygrass, clover, trefoil and alfalfa. On soils that are rated well suited, many kinds of plants that are suited to the climate can be easily maintained in adequate stands for at least 10 years. These soils have slopes of 0 to 15 percent, are well drained or moderately well drained, and have moderately high or high moisture-holding capacity. Occasional flooding and surface stones are not serious concerns, for the soils are seldom tilled.

Wild herbaceous upland plants.—In this group are perennial grasses and weeds that generally are established naturally. They include bluestem, quackgrass, panicgrass, goldenrod, wild carrot, nightshade, and dandelion. Soils that are well suited to these plants vary widely in texture, drainage, and slope. If drainage ranges between good and somewhat poor, slope is not limiting. Stoniness and occasional flooding are not serious concerns.

Hardwood plants.—These plants are nonconiferous trees, shrubs, and woody vines that produce nuts or other fruits, buds, catkins, twigs, or foliage that wildlife eat. They are generally established naturally but may be planted. Among the native kinds are oak, beech, cherry, maple, birch, poplar, apple, hawthorn, dogwood viburnum, grape, and briers. Soils well suited to these plants are deep or moderately deep, medium textured or moderately fine textured, and moderately well drained to somewhat excessively drained. Slope and surface stoniness are of little significance.

Also in this group are several varieties of fruiting shrubs that are raised commercially for planting. Autumn-olive, Amur honeysuckle, Tatarian honeysuckle, crabapple, multiflora rose, highbush cranberry, and silky cornel dogwood are some of the shrubs that generally are available and can be planted on soils that are rated well suited. In addition, highbush cranberry, silky dogwood, and other shrubs that have similar site requirements can be planted on soils that are rated suited. Hardwoods that are not available commercially can commonly be transplanted successfully.

Coniferous wildlife habitat.—This habitat consists of cone-bearing, evergreen trees and shrubs that are used by wildlife primarily as cover, though they also provide browse and seeds. Among them are Norway spruce, white pine, white-cedar, hemlock, and juniper. Generally, the plants are established naturally in areas where the cover of weeds and sod is thin. The soils that are well suited for coniferous wildlife habitat are those that cause plants to grow slowly and delay closure of the canopy. Survival of planted trees on these soils is low. Delayed closure of the canopy is important so that live branches will be maintained close to the ground for a long period of time. These low branches provide food and cover that are readily available to pheasants, rabbits, and other small animals. If the trees quickly form a dense canopy that shuts out the light, the lower branches die.

On soils rated poorly suited for coniferous wildlife habitat, a wide variety of species can be planted with good survival expected. Plants must be widely spaced, however, to retain their value for wildlife as long as possible because growth of trees on these soils is fairly rapid. In most places the maintenance of a pure stand of conifers is difficult because these soils are well suited to the competing hardwoods. Unless the stand is carefully managed, hardwoods invade and commonly overtop the conifers.

Wetland food and cover plants.—Making up this group are wild, herbaceous, annual and perennial plants that grow on moist to wet soils. These plants include smartweed, wild millet, rush, spikerush, sedges, rice cutgrass, mannagrass, and cattails. Soils having a rating of well suited are nearly level and poorly drained or very poorly drained. Soils that have a rating of suited are nearly level, and they are somewhat poorly drained or frequently flooded. Depth, stoniness, and texture of the surface layer are of little concern.

Shallow water developments.—This habitat element is rated on the basis of the soil being suitable for the construction of a low dike to impound shallow water. Marsh, which has only runoff as a source of water, is the most common type of shallow water development. Similarly, areas flooded for ducks are shallow impoundments on which domestic grains are grown in summer. The fields are flooded in fall, and the grain is covered to a depth of 18 inches by water supplied from an adjacent pond or stream.

Small shallow ponds are also developed as wildlife watering places.

Soils that are rated well suited to this use are nearly level (0 to 1 percent slopes), more than 36 inches deep to bedrock, and poorly drained or very poorly drained. Soils having a rating of suited are nearly level, 20 to 36 inches deep to bedrock, and somewhat poorly drained.

Excavated impoundments.—This habitat element is rated primarily on the basis of dug-out areas more than 6 feet deep. These areas are used for the production of fish or for recreation. Other areas of this element are level ditches, shallow excavations, and potholes that are created to improve the wetland wildlife habitat, particularly for waterfowl. Success of these impoundments depends primarily on a high water table as a source of water, but the impoundments may also receive surface runoff. The suitability for fish depends on depth, quality, temperature, and other qualities of the water. Depth should be at least 6 feet.

Nearly level, poorly drained and very poorly drained soils that are more than 72 inches deep and have a high fairly stable water table are well suited, provided they are not flooded frequently and have few or no limitations for constructing deep, dug-out impoundments. As the slope of the site increases, the difficulty or limitation of construction of the impoundment increases.

Classes of wildlife

The classes of wildlife, as used in table 3, are defined as follows:

Openland wildlife.—Examples of openland wildlife are pheasant, meadowlark, field sparrow, dove, cottontail rabbit, red fox, and woodchuck. These birds and mammals normally frequent areas of cropland, pasture, meadow, and lawns and areas overgrown with grasses, herbs, and shrubs.

Woodland wildlife.—Among the birds and mammals that prefer woodland are ruffed grouse, snowshoe hare, woodcock, thrush, vireo, scarlet tanager, gray squirrel, red squirrel, gray fox, white-tailed deer, raccoon, and wild turkey. They obtain food and cover in stands of hardwoods, coniferous trees, and shrubs, or a mixture of these plants.

Wetland wildlife.—Ducks, geese, rails, herons, shore birds, mink, muskrat, and beaver are familiar examples of birds and mammals that normally frequent wet areas, such as ponds, marshes, and swamps.

Each rating under "Classes of wildlife" in table 3 is based on the ratings listed for selected essential habitat elements from the first part of the table. For openland wildlife, the rating is based on the ratings shown for grain and seed crops, grasses and legumes, wild herbaceous upland plants, hardwood plants, and coniferous wildlife habitat. The rating for woodland wildlife is based on the ratings listed for all these elements except grain and seed crops. For wetland wildlife, the rating is based on the ratings shown for wetland food and cover plants, shallow water developments, and excavated impoundments.

Engineering Applications[8]

This soil survey for Schoharie County, New York, though made primarily for farm use, has considerable value for other uses. Some soil properties are of special interest to engineers because these properties affect the design, construction, and maintenance of roads, airports, pipelines, foundations of buildings, sewage-disposal systems, and drainage systems. The properties most significant to engineers are permeability to water, sheer strength, compressibility, grain size, compaction characteristics, soil drainage, plasticity, and pH. Also important are relief, depth to the water table, and depth to and kind of bedrock.

The information in this survey can be used by engineers and others to—

1. Make soil and land use studies that will aid in selecting and developing industrial, commercial, residential, and recreational sites.
2. Make preliminary estimates of the engineering properties of soils in the planning of agricultural drainage systems, farm ponds, irrigation systems, and diversion terraces.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting highway, airport, pipeline, and cable locations and in planning detailed investigations of the selected locations.
4. Locate probable sources of gravel or other construction materials.
5. Correlate performance of engineering structures with soil mapping units, and thus develop information that will be useful in designing and maintaining similar structures on like soils.
6. Determine the suitability of soil units for cross-country movement of vehicles and construction equipment.
7. Supplement information obtained from other published maps and reports and aerial photographs for the purpose of making maps and reports that can be used readily by engineers and others.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

With the soil map for identification, the engineering interpretations in this subsection can be useful for many purposes. It should be strongly emphasized, however, that these interpretations generally will not eliminate the need for subsurface investigation, subsequent testing, and engineering analysis at the site of the proposed engineering works. In most places the intensity of investigation needed is proportional to the weight of the loads to be applied, to the depth and amount of earthwork involved, and to the cost of the contemplated works. Nevertheless, the engineering subsection and the soil map, together with the soil descriptions, are useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected.

Much of the information in this subsection is in tables 4, 5, and 6. Table 4 lists engineering data that were obtained when selected soils in the county were tested. Table 5 lists the soils and gives an estimate of their properties. In table 6 are interpretations of the engineering properties of the soils.

[8] By JOHN B. FLECKENSTEIN, senior agronomist, EDWARD A. FERNAU, assistant soils engineer, and LYNDON H. MOORE, associate soils engineer, State of New York, Department of Transportation, Bureau of Soil Mechanics, and WALTER S. ATKINSON, State conservation engineer, Soil Conservation Service.

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Some of the terms used by soil scientists may not be familiar to engineers. Others, though familiar, may have a special meaning in soil science. Many terms used in the soil survey are defined in the Glossary, but most of the special terms used in this subsection are defined in the following paragraphs.

Bearing Capacity: The unit load that can be placed on a soil without detrimental deformation to the structure that is supported. It is generally expressed in tons or pounds per square foot. In this survey the adjective ratings given for bearing capacity are estimated and should not be used to assign specific values to bearing capacity.

Table 4.—*Engineering*

[Tests performed by the State of New York, Department of Transportation, Bureau of Soil Mechanics in cooperation with Bureau of ... Dashes indicate determination was not

Soil name and location	Parent material	New York report No. S61-NY48	Depth	Moisture-density [1] Maximum dry density	Moisture-density [1] Optimum moisture	Moisture-density [1] Density of soil in place	Lineal shrinkage	Specific gravity [2]	Percolation rate (10)	Reaction	Organic matter [3]
			Inches	*Lb. per cu. ft.*	*Percent*	*Lb. per cu. ft.*	*Percent*		*Min. per in.*	*pH*	*Percent*
Barbour loam:	Alluvium.	5–1	0–8	107	16	92	3.6	2.67	--------	5.1	1.75
One-half mile south of		5–2	8–17	113	14	97	4.0	2.70	43	5.4	.77
Fultonham on Boucks		5–3	17–24	118	12	--------	4.0	2.71	--------	5.5	.76
Island. (Modal profile.)		5–4	24–42	122	11	--------	0.2	2.71	--------	5.4	--------
		5–5	42–55	119	12	75	0.0	2.71	--------	5.7	--------
Barbour fine sandy loam:	Alluvium.	6–1	0–6	114	13	94	3.4	2.67	--------	5.8	1.61
One-half mile south of		6–3	8–24	116	13	80	4.0	2.70	3	5.8	.99
Fultonham on Boucks		6–7	41–48	118	12	--------	2.6	2.70	--------	5.9	--------
Island near creek.		6–8	48–61	121	13	118	0.0	2.71	1	6.3	--------
Barbour loam:	Alluvium.	7–1	0–7	113	15	--------	6.0	2.68	--------	6.2	1.79
One-half mile south of		7–3	11–27	115	13	109	3.8	2.69	7	7.0	--------
Fultonham on Boucks		7–5	33–56	120	11	102	2.0	2.69	--------	6.3	1.35
Island. (Coarse substratum.)											
Darien channery silt loam:	Deep glacial till.	2–2	5–13	107	14	92	8.0	2.64	60	6.8	4.09
Three-eighths mile north of		2–4	22–31	117	15	104	7.6	2.70	>120	5.7	.62
Howes Cave at corner of		2–5	31–43	116	14	--------	7.8	2.71	--------	7.0	.83
Robinson and Howes		2–6	43–56	124	13	105	7.6	2.71	>120	8.1	--------
Cave Roads. (Intergrade toward Burdett soil).											
Darien silt loam:	Deep glacial till.	10–1	0–7	88	27	81	7.6	2.60	51	7.1	6.51
1.25 miles northwest of		10–4	17–34	110	18	100	9.0	2.75	>120	7.0	.88
Sharon Springs on east		10–5	34–54	115	16	115	7.8	2.74	--------	7.5	--------
side of Town Road. (Modal profile.)											
Erie channery silt loam:	Deep glacial till.	4–1	0–6	109	16	--------	5.6	2.63	--------	5.3	3.26
4.50 miles northeast of		4–3	8–18	122	12	--------	4.4	2.70	--------	6.6	2.64
Schoharie and 40 feet		4–5	19–41	124	12	--------	5.6	2.71	--------	7.7	.97
south of the corner of		4–6	41–60	125	12	--------	5.6	2.74	--------	8.1	--------
State Route 25. (Modal profile.)											
Erie channery silt loam:	Deep glacial till.	12–1	0–5	101	21	80	6.4	2.61	--------	6.1	4.80
One mile east of Carlisle at		12–3	7–13	100	22	--------	7.6	2.64	35	6.1	3.08
the southwest corner of		12–6	21–40	124	12	118	4.8	2.70	>120	6.8	.69
intersection of U.S.		12–7	40–60	129	10	110	10.4	2.71	>120	7.9	--------
Highway 20 and County Road 7–A. (Intergrade toward Langford soil.)											

See footnotes at end of table.

COMPRESSIBILITY: The capability of a soil to be compressed by a superimposed load.

LINEAL SHRINKAGE: The decrease in one dimension of the soil mass that occurs when the moisture content is reduced from a stipulated percentage to the content at the shrinkage limit.

LIQUID LIMIT: The moisture content at which the soil material passes from a plastic to a viscous, semiliquid state.

MOISTURE CONTENT: The ratio of the weight of water contained in a soil to the dry weight of the soil. It is generally expressed as a percentage.

test data

Public Roads (BPR) in accordance with standard procedures of the American Association of State Highway Officials (ASSHO) (2). made or information does not apply]

Mechanical analysis [4]															Liquid limit	Plasticity index	Classification	
Percentage passing sieve—											Percentage smaller than—						AASHO	Unified [5]
3-in.	2-in.	1½-in.	1-in.	¾-in.	⅜-in.	No. 4 (4.7 mm.)	No.10 (2.0 mm.)	No.40 (0.42 mm.)	No.60 (0.25 mm.)	No.200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
-----	-----	-----	-----	-----	-----	100	100	100	99	85	70	42	20	12	24	3	A-4(8)	ML
-----	-----	-----	-----	-----	-----	100	100	99	98	77	59	36	19	13	22	5	A-4(8)	ML-CL
-----	-----	-----	-----	-----	-----	100	100	99	99	73	52	32	19	13	19	2	A-4(8)	ML
-----	-----	-----	-----	-----	-----	100	99	92	79	36	23	14	10	7	[6] NP	[6] NP	A-4(0)	SM
-----	-----	-----	-----	-----	-----	100	99	70	37	13	9	7	4	4	NP	NP	A-2-4(0)	SM
-----	-----	-----	-----	-----	-----	100	100	100	98	62	45	28	13	9	20	1	A-4(5)	ML
-----	-----	-----	-----	-----	-----	100	100	99	95	74	64	40	20	13	20	2	A-4(8)	ML
-----	-----	-----	-----	-----	-----	100	100	98	95	55	39	22	10	9	NP	NP	A-4(4)	ML
-----	-----	100	99	96	87	79	64	31	12	3	-----	-----	-----	-----	NP	NP	A-1-b(0)	SP
-----	-----	-----	-----	-----	100	100	100	99	97	62	46	29	16	10	23	4	A-4(5)	ML
-----	-----	-----	-----	100	100	100	100	99	97	66	51	33	18	11	22	3	A-4(6)	ML
-----	-----	-----	-----	-----	-----	100	100	90	64	23	18	13	8	6	NP	NP	A-2-4(0)	SM
100	96	93	90	86	81	77	74	70	66	55	45	40	21	16	35	11	A-6(4)	ML-CL
100	95	91	90	88	82	78	75	68	65	53	46	35	22	15	25	8	A-4(4)	CL
-----	100	98	97	96	91	86	81	73	69	58	50	38	25	21	24	9	A-4(5)	CL
-----	100	99	97	95	89	83	78	69	65	52	40	32	19	13	36	7	A-4(3)	ML
100	99	98	98	96	96	96	93	88	85	76	69	53	28	17	46	15	A-7-5(11)	ML or OL
-----	100	98	97	96	93	92	87	81	79	73	61	51	36	30	38	16	A-6(10)	CL
-----	-----	-----	-----	100	97	94	86	73	70	61	56	47	30	22	32	13	A-6(6)	CL
-----	100	98	93	92	89	86	82	75	69	53	45	33	15	10	35	9	A-4(4)	ML-CL
-----	-----	100	99	98	95	91	83	71	65	45	32	20	11	8	19	3	A-4(2)	SM
-----	100	97	95	92	85	80	74	65	62	51	42	32	17	13	24	7	A-4(3)	ML-CL
-----	100	97	94	92	85	80	70	62	59	49	39	29	17	11	21	5	A-4(3)	SM-SC
100	98	96	94	92	87	85	81	75	70	54	45	33	14	8	33	5	A-4(4)	ML
-----	100	94	87	81	74	71	68	62	58	51	45	30	9	6	31	5	A-4(3)	ML
100	96	92	86	83	76	72	66	57	53	41	34	26	13	10	22	6	A-4(1)	SM-SC
100	95	93	84	81	75	71	66	57	54	41	36	25	13	10	25	8	A-4(1)	SC

TABLE 4.—*Engineering*

Soil name and location	Parent material	New York report No. S61-NY48	Depth	Moisture-density [1]: Maximum dry density	Moisture-density [1]: Optimum moisture	Moisture-density [1]: Density of soil in place	Lineal shrinkage	Specific gravity [2]	Percolation rate *(10)*	Reaction	Organic matter [3]
			Inches	*Lb. per cu. ft.*	*Percent*	*Lb. per cu. ft.*	*Percent*		*Min. per in.*	*pH*	*Percent*
Erie channery silt loam: 1.25 miles north of Carlisle Center, in a cut on east side of County Road 7-A. (Intergrade toward wetter soil.)	Deep glacial till.	13-1	0-8	95	25	70	7.8	2.61	--------	6.3	6.53
		13-3	10-20	120	14	--------	6.4	2.72	--------	6.4	.75
		13-4	20-30	121	13	118	4.4	2.72	--------	6.7	1.72
		13-5	30-40	122	12	106	6.0	2.74	--------	7.8	--------
Honeoye silt loam: 2 miles east of Cobleskill at the junction of State Routes 7 and 145, in a borrow pit. (Modal profile.)	Deep glacial till.	1-2	4-18	103	18	--------	6.4	2.64	4	7.4	4.0
		1-4	23-35	111	16	103	8.0	2.70	30	6.9	.85
		1-6	46-70	120	12	106	8.4	2.72	>120	8.0	--------
Honeoye silt loam: 3.5 miles southeast of Sharon Springs on the east side of State Route 10, in a cut. (Intergrade toward Mohawk soil.)	Deep glacial till.	11-1	0-7	98	22	86	5.0	2.61	--------	7.2	5.11
		11-3	15-40	120	13	113	6.0	2.72	--------	7.6	3.03
		11-4	40-58	123	13	120	4.4	2.72	--------	7.4	--------
		11-5	360	124	11	120	4.4	2.73	--------	7.2	--------
Honeoye silt loam: One-eighth mile north of the junction of State Routes 30 and 43 north of Schoharie, in a cut. (Intergrade toward Lima soil.)	Deep glacial till.	14-1	0-5	111	15	96	4.4	2.65	--------	6.6	2.48
		14-4	8-32	113	16	104	7.6	2.73	--------	7.1	1.28
		14-5	32-42	128	9	108	5.0	2.72	--------	7.7	--------
Schoharie silt loam: North edge of Central Bridge and 100 yards east of State Route 30A. (More acid than normal.)	Lacustrine sedi ments.	3-1	0-5	89	25	--------	5.0	2.58	9	5.9	5.79
		3-3	7-22	100	24	97	11.0	2.75	>120	4.9	.80
		3-5	31-60	101	23	97	8.6	2.77	>120	8.0	--------
Schoharie silt loam: 1 mile south of North Blenheim and 100 yards east of State Route 30. (Well drained.)	Lacustrine sedi-ments.	8-1	0-4	91	27	--------	3.8	2.64	--------	5.4	4.78
		8-4	13-30	102	23	--------	10.4	2.76	--------	6.0	.58
		8-6	39-55	107	20	--------	10.2	2.77	--------	8.4	--------
		8-7	120-180	95	29	--------	12.2	2.80	--------	8.3	--------
Schoharie silt loam: 1.5 miles south of Schoharie on the west side of State Route 30. (Modal profile.)	Lacustrine sediments.	15-1	0-7	89	27	72	6.2	2.63	--------	6.9	5.59
		15-4	16-34	101	23	93	8.2	2.79	--------	5.4	.91
		15-6	44-54	111	19	99	8.4	2.78	--------	7.6	--------

[1] Based on AASHO Designation: T 99-57, Method A (*2*).
[2] Test for specific gravity was made on fraction passing a ¾-inch sieve.
[3] Determined by the wet combustion method. Samples containing 5 percent or more of organic matter are given a Unified classification of OL.
[4] Mechanical analyses according to the AASHO Designation T 88-57 (*2*). Results by this procedure may differ somewhat from the results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by hydrometer method, and the various grain-size fractions are calculated on the basis of all the material,

test data—Continued

Mechanical analysis [4]																	Classification	
Percentage passing sieve—											Percentage smaller than—				Liquid limit	Plasticity index	AASHO	Unified [5]
3-in.	2-in.	1½-in.	1-in.	¾-in.	⅜-in.	No. 4 (4.7	No.10 (2.0	No.40 (0. 42	No.60 (0. 25	No.200 (0. 074	0.05 mm.	0.02 mm.	0. 005 mm.	0. 002 mm.				
-----	100	98	91	89	85	83	79	75	71	59	49	37	20	12	43	8	A-5(5)	ML or OL
-----	-----	100	96	92	88	86	82	79	76	65	48	37	22	18	28	10	A-4(6)	CL
-----	100	94	92	88	82	77	73	65	62	52	45	35	22	15	25	8	A-4(3)	CL
-----	-----	100	94	91	84	79	73	66	63	53	45	35	25	18	26	9	A-4(4)	CL
-----	100	99	96	94	87	82	78	72	70	61	52	43	29	21	36	10	A-4(5)	ML-CL
-----	100	99	96	94	91	88	84	78	76	68	60	48	34	26	29	10	A-4(6)	CL
100	97	95	90	87	81	77	71	63	60	52	45	37	26	19	30	13	A-6(4)	CL
-----	-----	-----	100	99	97	95	89	80	76	65	59	46	20	13	46	14	A-7-5(8)	ML or OL
-----	100	97	93	91	84	76	69	59	56	49	42	33	21	15	28	12	A-6(4)	SC
100	99	93	86	82	74	69	66	54	50	44	40	32	20	15	26	9	A-4(2)	GC
-----	-----	-----	100	99	96	94	90	84	82	78	69	57	32	18	23	8	A-4(8)	CL
-----	-----	100	99	95	89	86	80	72	68	53	45	34	17	10	28	8	A-4(4)	CL
100	97	94	94	91	88	85	83	76	72	61	50	39	27	25	32	14	A-6(7)	CL
100	92	89	82	75	68	62	57	49	46	36	32	24	15	10	21	7	A-4(0)	GM-GC
-----	-----	-----	-----	-----	-----	100	99	95	92	88	80	74	45	25	46	15	A-7-5(11)	ML or OL
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	100	91	88	65	47	41	16	A-7-6(11)	ML-CL
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	100	91	89	66	46	43	18	A-7-6(12)	ML-CL
-----	-----	-----	-----	-----	-----	100	99	97	95	95	86	78	44	26	42	11	A-7-5(9)	ML
-----	-----	-----	-----	-----	-----	-----	-----	-----	100	99	91	89	60	46	42	16	A-7-6(11)	ML-CL
-----	-----	-----	-----	-----	-----	-----	100	98	96	95	87	82	48	39	37	22	A-6(13)	CL
-----	100	99	99	99	99	99	99	99	99	99	91	88	80	71	59	28	A-7-5(19)	MH-CH
-----	-----	-----	-----	-----	100	99	99	97	95	92	90	72	39	22	47	22	A-7-5(14)	CL or OL
-----	-----	-----	-----	-----	-----	-----	100	99	99	98	89	85	69	53	45	19	A-7-6(13)	ML-CL
-----	-----	-----	100	99	97	96	95	90	88	84	72	59	53	39	35	16	A-6(10)	CL

including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method, and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses data used in this table are not suitable for naming textural classes for soil.

[5] Based on the Unified Soil Classification system, Tech. Memo. No. 3-357 (*17*). SCS and BPR have agreed to consider that all soils having plasticity indexes within two points of the A-line are to be given a borderline classification. Examples of borderline classifications are ML-CL and SM-SC.

[6] Nonplastic.

TABLE 5.—*Estimated*

[Because Alluvial land (Al) is variable and Muck, slightly acid (Ms) and Muck and Peat, strongly acid

Soil series and map symbols	Depth to bedrock	Depth to seasonally high water table	Depth from surface	Classification: USDA	Classification: Unified	Classification: AASHO
	Feet	*Feet*	*Inches*			
Allis (Mapped only in an undifferentiated group with Tuller soils.)	1½–3½	0–1	0–12	Silt loam	ML, CL	A–4, A–6
			12–24	Shaly silty clay	CL, CH	A–6, A–7
			24	Fissile shale bedrock		
Appleton (ApB)	5–8+	½–1	0–16	Channery silt loam	ML	A–4
			16–22	Channery silt loam	ML, CL	A–4
			22–26	Channery loam	GM, GC, SM, SC	A–4
Arnot (ArC)	1–1½	<1½	0–16	Flaggy silt loam	ML	A–4
			16	Sandstone or siltstone bedrock.		
Barbour (Ba, BbB, Bg) (For properties of Tioga soils in these mapping units, refer to the Tioga series.)	6–20+	>3	0–24	Loam	ML	A–4
			24–42	Loamy fine sand and fine sandy loam.	SM, ML	A–2
			42–65	Stratified sand and gravel.	SM, SP	A–2
Basher (Bm) (For properties of Middlebury soils in this unit, refer to the Middlebury series.)	>20	1–2	0–15	Silt loam	ML	A–4
			15–24	Very fine sandy loam	ML	A–4
			24–30	Sand, silt, and gravel	SM	A–2
Burdett (BrB, BrC) (For properties of Erie soils in these mapping units, refer to the Erie series.)	>2½	10	0–20	Channery silt loam	ML or ML–CL	A–4
			20–40	Shaly silty clay loam	CL	A–6
Cattaraugus (CaD[1], CaE[1])	>10	2–3	0–20	Stony silt loam and loam	GM or ML	A–4
			20–60	Very channery loam or silt loam.	GM, GC	A–4, A–2
Chenango (Mapped only in an undifferentiated group with Tunkhannock soils.)	>10	>5	0–17	Gravelly silt loam	GM, GP, SM, SC	A–1, A–2
			17–25	Very gravelly sandy loam or loamy sand.	GW, GP, GM, SP, SM	A–1, A–2
Chippewa (ChA,[1] ChC,[1] CnC[2]) (For properties of Norwich soils in these mapping units, refer to the Norwich series.)	>2	0–1	0–15	Stony silt loam	ML, CL	A–4
			15–30	Very channery loam or silt loam.	GM, GC	A–2
Conesus (CoB, CoC)	4–20+	1½–2½	0–12	Channery silt loam	ML, CL	A–4
			12–36	Channery silt loam	ML, CL	A–4
			36–42	Channery loam	GM, GC or SM, SC	A–4
Culvers (CuB,[1] CuC,[1] CuD[1])	>5	1½–2½	0–20	Stony silt loam	SM, SC	A–4, A–2
			20–72	Channery silt loam	GM, GC	A–4
Darien (DaB, DaC, DcC3, DdB, DdC, DdD, DeB, DeC, DsB3, DuC3).	3–8+	½–2½	0–9	Silt loam or channery silt loam.	ML, CL	A–4, A–6
			9–34	Silty clay loam or shaly or channery silty clay loam.	ML, CL	A–4, A–6
			34–54	Shaly silty clay loam or clay loam.	ML, CL, SM	A–4, A–6
Erie (Mapped only in an undifferentiated group with Burdett soils.)	>8	1–1½	0–21	Channery silt loam to loam.	SM, SC, ML, CL	A–4
			21–40	Channery loam	SM, SC	A–4, A–2
Farmington (FaB, FaF)	½–2	>2	0–20	Silt loam	ML	A–4
			20	Fissured limestone bedrock.		

See footnotes at end of table.

engineering properties of soils

(Mu), are highly organic and not suitable for engineering works, their properties were not estimated]

Percentage passing sieve—			Permeability	Reaction	Available water capacity	Remark
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 200 (0.074 mm.)				
			Inches per hour	*pH*	*Inches per inch of depth*	
90–100	80–100	80–95	0.63–2.0	5.0–6.0	0.16–0.22	
85–95	80–90	60–80	0.2–0.63	5.0–5.5	0.10–0.17	
80–90	65–70	50–70	0.63–2.0	5.6–7.3	0.20–0.22	
80–90	65–70	50–65	0.63–2.0	5.6–7.3	0.17–0.21	
65–80	60–70	35–50	<0.2	7.5	----------	
70–80	65–85	55–70	0.63–2.0	5.0–5.5	0.15–0.19	In wet periods a water table is perched above the bedrock in places.
100	100	60–75	0.63–2.0	5.5–6.5	0.14–0.16	In the Barbour soil in unit BbB, gravel and coarse fragments make up 20 percent or more of the upper part; the lower part is extremely variable.
80–100	60–100	20–55	>6.3	5.5–6.5	0.09–0.11	
80–100	60–100	3–30	>6.3	5.5–6.5		All Barbour soils are susceptible to occasional flooding.
100	100	65–80	0.63–2.0	5.5–6.5	0.14–0.16	Susceptible to occasional flooding.
100	90–100	50–70	0.63–2.0	6.5–6.5	0.11–0.14	
80–100	60–100	15–25	0.63–6.3	5.5–6.5	----------	
75–85	65–75	55–65	0.63–2.0	5.0–5.5	0.18–0.22	
85–95	80–90	70–80	<0.63	5.5–7.8	0.17–0.19	
60–80	50–75	45–65	0.63–2.0	4.5–6.5	0.12–0.20	
50–65	40–60	20–40	<0.63	4.5–6.0	0.12–0.16	
40–70	25–60	5–30	0.63–6.3	4.8–5.2	0.13–0.17	
30–70	20–60	0–15	>6.3	5.2–5.8	0.07–0.10	
75–90	70–80	60–70	0.63–2.0	5.0–5.5	0.17–0.19	
45–65	40–60	15–35	<0.20	5.5–6.0	0.10–0.15	
75–95	65–80	50–65	0.63–2.0	5.6–6.0	0.16–0.20	
80–95	75–85	50–60	0.63–2.0	5.6–6.5	0.17–0.20	
65–80	60–75	40–45	<0.2	7.5	----------	
75–85	50–70	30–50	0.63–2.0	5.1–6.0	0.17–0.22	
55–70	50–65	35–45	<0.2	5.5–7.3	----------	
90–100	85–90	70–80	0.63–2.0	6.0–7.0	0.17–0.20	
90–95	85–90	65–75	0.2–0.63	5.6–7.3	0.17–0.19	
90–95	85–90	45–65	<0.2	7.4	----------	
75–90	65–85	40–60	0.63–2.0	5.0–6.5	0.15–0.18	
70–80	60–75	30–50	<0.2	6.5–7.5	----------	
70–95	60–80	50–60	0.63–6.3	5.5–6.5	0.16–0.19	

TABLE 5.—*Estimated engineering*

Soil series and map symbols	Depth to bedrock	Depth to seasonally high water table	Depth from surface	Classification: USDA	Unified	AASHO
	Feet	*Feet*	*Inches*			
Fredon (Fh) (For properties of Halsey soils in this mapping unit, refer to the Halsey series.)	>5	½–1	0–34	Gravelly loam	ML	A–4
			34–48	Very gravelly sandy loam and sandy clay loam.	GM, GC	A–1, A–2
Halsey (Mapped only in an undifferentiated group with Fredon soils.)	>8	0–½	0–10	Gravelly loam	ML, CL	A–4
			10–21	Gravelly loam	ML	A–4
			21–34	Gravelly loamy sand and cobbly loamy sand.	GM, GC	A–1, A–2
Holly (Ha) (For properties of Papakating soil in this unit, refer to the Papakating series.)	>8	½–1	0–36	Silt loam	ML, CL	A–4
Honeoye (HfB, HfC) (For properties of Farmington soils in these units, refer to the Farmington series.)	3½–8+	2½–3	0–10	Silt loam	ML, CL	A–4
			10–28	Channery silt loam or loam.	ML, CL	A–4 or A–6
Howard (HgA, HgC)	>10	>5	0–12	Gravelly loam or silt loam.	GM, GC, GP–GM	A–2, A–4
			12–47	Very gravelly loam	GM, GC, GP–GM	A–2
			47–52	Very gravelly sandy loam.	GM, GC; GP, GW	A–1
Hudson (Mapped only in an undifferentiated group with Schoharie soils.)	>8	1–2	0–10	Silty clay loam	ML, CL	A–6, A–7
			10–36	Silty clay or clay	ML, CL	A–6, A–7
			36–42		ML, CL	A–6, A–7
Ilion (IaB, IlA, IlC) (For properties of Appleton soils in mapping unit IaB and for Lyons soils in mapping units IlA and IlC, refer to the respective series.)	>8	0–½	0–17	Silt loam	ML–CL	A–4 or A–6
			17–34	Silty clay loam	CL	A–6
			34–50	Silty clay loam	CL	A–6
Lakemont (LaA, LdB) (For properties of Madalin soils in these mapping units, refer to the Madalin series.)	>10	0–½	0–11	Silty clay loam	ML, CL, OL	A–7
			11–48	Silty clay	CL, ML	A–6, A–7
Langford (Mapped only in an undifferentiated group with Nunda soils.)	4–30+	1½–2	0–20	Channery loam or silt loam.	GM, GC, CL	A–4
			20–42	Channery silt loam	GM, GC	A–4, A–2
Lansing (LhB, LhC, LhC3)	>8	>2	0–17	Channery silt loam	ML, CL	A–4
			17–30	Channery silt loam	ML, CL	A–4 or A–6
			30–48	Channery loam	ML, CL	A–4
Lima (Mapped only in an undifferentiated group with Mohawk soils.)	8	1½–2	0–12	Silt loam	ML, CL	A–4
			12–21	Silt loam or loam	CL	A–4
			21–35	Gravelly loam	SM, SC, ML, CL	A–4
Lordstown (LmA, LmC, LmD, LmE, LnB, LoE,[2] LrF[2]). (For properties of Oquaga soils in mapping units LoE and LrF and for Nassau soil in mapping unit LrF, refer to the respective series.)	2–3½	1½–3½	0–27	Channery loam or silt loam.	ML	A–4
			27	Sandstone or shale bedrock.		
Lyons (LsB, LyB [2]) (For properties of Ilion soils in mapping unit LyB, refer to the Ilion series.)	1–5+	0–½	0–10	Silt loam	ML–CL, ML or OL	A–4
			10–18	Fine sandy loam	ML, SM	A–4
			18–40	Gravelly silt loam	ML–CL	A–4

See footnotes at end of table.

properties of soils—Continued

Percentage passing sieve— No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 0.074 mm.)	Permeability	Reaction	Available water capacity	Remark
			Inches per hour	*pH*	*Inches per inch of depth*	
65–80	60–75	55–65	0.63–2.0	6.0–7.3	0.15–0.19	
40–60	25–30	15–25	0.63–6.3	>7.4	------------	
85–95	70–80	60–75	0.63–2.0	6.0–7.3	0.18–0.21	
65–80	60–75	55–65	0.63–6.3	6.0–7.3	0.15–0.19	
40–60	25–35	15–25	0.63–6.3	>7.4	------------	
80–100	75–95	65–80	0.63–2.0	5.5–6.5	0.16–0.20	Susceptible to flooding.
75–85	70–80	50–60	0.63–2.0	6.0–7.3	0.15–0.19	
75–85	80–90	60–70	0.2–2.0	6.0–7.3	0.15–0.19	
40–60	25–50	10–40	2.0–6.3	5.5–6.0	0.13–0.17	
30–50	20–40	10–30	0.63–2.0	6.0–7.3	0.08–0.10	
20–60	20–40	5–20	>6.3	>7.4	0.03–0.08	
100	95–100	85–95	0.2–2.0	5–5.6.5	0.15–0.20	
100	100	95–100	<0.63	5.5–6.5	0.09–0.15	
95–100	95–100	85–100	<0.2	>7.4	0.07–0.14	
80–90	75–85	55–65	0.2–2.0	6.0–6.5	0.15–0.20	
90–95	85–90	65–75	<0.63	6.5–7.3	0.17–0.19	
90–95	85–90	55–65	<0.2	>7.4	------------	
100	95–100	85–95	0.2–0.63	6.0–7.3	0.20–0.25	
100	95–100	80–95	<0.2	6.6–7.4	0.11–0.18	
60–70	60–70	45–55	0.63–2.0	5.0–5.5	0.16–0.20	
50–70	45–65	30–50	<0.2	6.5–7.3	------------	
80–90	80–90	55–65	0.63–2.0	5.0–5.5	0.17–0.20	
75–95	65–90	55–65	0.2–0.63	6.0–7.3	0.16–0.20	
65–80	60–70	50–60	<0.63	>7.4	------------	
85–95	80–95	60–70	0.63–2.0	5.5–7.3	0.17–0.22	
65–95	65–90	50–65	0.63–2.0	6.0–7.3	0.17–0.22	
80–90	70–85	40–60	<0.63	>7.4	------------	
70–80	65–85	55–70	0.63–2.0	5.6–6.0	0.15–0.19	In wet periods a water table is perched above bedrock in places, especially where bedrock is below 30 inches.
90–100	90–100	75–85	0.63–2.0	6.0–7.3	0.17–0.22	
100	90–100	40–70	0.63–2.0	6.0–7.0	0.10–0.15	
60–70	55–75	50–60	<0.63	>7.4	------------	

TABLE 5.—*Estimated engineering*

Soil series and map symbols	Depth to bedrock	Depth to seasonally high water table	Depth from surface	Classification: USDA	Classification: Unified	Classification: AASHO
	Feet	*Feet*	*Inches*			
Madalin:						
Over till (Ma)	>5	0–½	0–6	Silty clay loam	ML, CL, OL	A–6
			6–30	Silty clay	ML, CL	A–6, A–7
			30–50	Channery loam	ML–CL	A–4
Deep (Mapped only in an undifferentiated group with Lakemont soils.)	>5	0–½	0–6	Silty clay loam	ML, CL, OL	A–6
			6–40	Silty clay	ML, CL	A–6, A–7
Mardin (McB, McC, McC3, McD, McE, MdF [2], MeE [2]). (For properties of Cattaraugus soils in mapping unit MdF and Culvers soils in MeE, refer to the respective series.)	>5	1½–2½	0–22	Channery silt loam	ML	A–4
			22–60	Channery or very channery silt loam.	ML, GM, GC	A–4
Middlebury (Mapped only in an undifferentiated group with Basher soils.)	>20	1½–2½	0–18	Silt loam	ML	A–4
			18–24	Gravelly loam	ML	A–4
			24–35	Gravelly sandy loam	SM, SP	A–2
Mohawk (MhC, MhC3, MhD, MhF, MkC,[2] MkD,[2] MlB, MlB3). (For properties of Honeoye soils in mapping units MhC, MhC3, MhD, and MhF; for Lansing soil in units MkC and MkD; and for Lima soils in units MlB and MlB3, refer to the respective series.)	>8	1½–3	0–20	Silt loam	ML, CL	A–6
			20–41	Silty clay loam	CL	A–6
			41–44	Gravelly or cobbly silt loam.	GM, GC, SM, SC	A–4, A–2
Morris (MoB,[1] MoC[1])	>5	½–1½	0–15	Stony silt loam	GM, GC, ML, CL	A–4
			15–60	Channery silt loam or loam.	GC, SM, SC	A–4, A–2
Nassau (NaC, NaE)	1–1½	>2	0–10	Shaly silt loam	ML, GM	A–4
			10–20	Very shaly silt loam	GM, GC	A–2, A–4
			20	Fissile shale bedrock.		
Norwich (Mapped only in an undifferentiated group with Chippewa soils.)	>5	0–1	0–13	Stony or very stony silt loam.	ML, CL, GM, OH	A–4
			13–42	Very gravelly or stony silt loam or loam.	GM, GC	A–4, A–2
Nunda (NdB, NdC, NdC3, NdD, NdD3, NlB, NlC, NlC3, NlD). (For properties of Langford soils in mapping units NlB, NlC, NlC3, and NlD, refer to the Langford series.)	>8	1½–3	0–18	Channery silt loam	ML, CL	A–4
			18–40	Channery clay loam or heavy loam.	ML, CL	A–6
Odessa (OdA, OdB, OdC, OrC3) (For properties of Rhinebeck soils in these mapping units, refer to the Rhinebeck series.)	3–10+	½–1½	0–9	Silt loam or silty clay loam.	ML, CL	A–7 or A–6
			9–42	Silty clay	MH, CH, ML, CL	A–7
Oquaga (OsC, OsD, OsE)	2–3½	1½–3½	0–16	Stony silt loam	ML	A–4
			16–24	Very channery silt loam	GM, GC	A–2
			24	Sandstone bedrock.		
Papakating (Mapped only in an undifferentiated group with Holly soils.)	>8	0–½	0–11	Silt loam	ML, OL	A–4
			11–34	Silty clay loam	ML, CL	A–4
			34–48	Variable.		
Phelps (PhA, PlB)	>8	1½–2½	0–8	Gravelly silt loam	GM, GC, SM, SC	A–2, A–4
			8–25	Gravelly loam	GM, GC, SM, SC	A–1, A–4
			25–31	Very gravelly loamy sand	GM, GC, SM, SC	A–1, A–2

See footnotes at end of table.

properties of soils—Continued

Percentage passing sieve— No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	Permeability	Reaction	Available water capacity	Remark
			Inches per hour	*pH*	*Inches per inch of depth*	
100	90–100	85–95	0.20–2.0	6.0–7.3	0.20–0.25	
100	90–100	80–95	<0.63	6.6–7.4	0.11–0.18	
75–85	70–80	50–60	<0.63	>7.4	----------	
100	90–100	85–95	0.20–2.0	6.0–7.3	0.20–0.25	
100	90–100	80–95	<0.63	6.6–7.4	0.11–0.18	
75–85	75–85	55–65	0.20–0.63	4.5–5.5	0.17–0.22	
65–75	65–75	45–55	<0.2	5.5–7.3	----------	
100	100	65–80	0.63–2.0	5.5–6.0	0.16–0.20	
100	90–100	50–70	0.63–2.0	5.5–6.5	0.16–0.18	
80–100	60–100	15–25	0.63	5.5–6.5	----------	
90–100	85–95	65–75	0.63–2.0	5.5–7.3	0.17–0.20	
75–95	75–95	55–70	0.2–2.0	6.5–7.3	0.18–0.20	
55–80	45–70	20–40	<0.63	>7.4	----------	
70–80	45–85	45–65	0.63–2.0	4.5–5.5	0.08–0.10	
50–80	45–70	30–50	<0.2	4.5–5.5	----------	
70–90	60–80	45–65	0.63–2.0	5.0–5.5	0.13–0.17	
50–70	45–65	30–50	0.63–2.0	4.5–5.0	0.08–0.15	
65–80	55–75	40–60	0.63–2.0	5.5–6.8	0.16–0.22	
55–70	45–65	20–40	<0.2	5.5–6.5	0.10–0.14	
75–85	65–75	55–65	0.63–2.0	5.5–6.0	0.15–0.20	
85–95	80–90	70–80	<0.63	6.0–7.3	0.17–0.21	
100	95–100	85–95	0.2–2.0	5.5–7.3	0.17–0.25	
100	100	95–100	<0.2	6.0–7.3	0.09–0.15	
70–80	65–85	55–70	0.63–2.0	4.5–5.5	0.15–0.20	In wet periods a water table is perched above bedrock in places.
40–60	25–50	10–20	2.0–6.3	4.5–5.0	0.10–0.14	
100	90–100	70–80	0.63–6.3	5.5–6.5	0.18–0.21	
100	90–100	70–80	0.63–2.0	5.5–6.5	0.18–0.20	
55–80	40–60	30–50	0.63–2.0	6.0–7.0	0.15–0.20	In the Phelps soil unit PlB, varved clay and silt occur at a depth of 24 to 36 inches.
55–75	40–60	20–40	0.63–2.0	6.5–7.4	0.15–0.20	
40–60	30–50	15–35	>0.63	>7.4	----------	

TABLE 5.—*Estimated engineering*

Soil series and map symbols	Depth to bedrock	Depth to seasonally high water table	Depth from surface	Classification		
				USDA	Unified	AASHO
	Feet	*Feet*	*Inches*			
Red Hook (Rh)	>8	½–1½	0–30	Gravelly silt loam	GM, GC, ML, CL	A–4
			30–36	Gravel, sand and silt	GM, GC, ML, CL	A–4
Rhinebeck (Mapped only in an undifferentiated group with Odessa soils.)	>3½	½–1½	0–14	Silt loam or silty clay loam.	ML, CL	A–4, A–6
			14–29	Silty clay	ML, CL	A–4, A–6
			29–51	Silty clay loam	ML, CL	A–4, A–6
Schoharie (ShB, ShC, SnB3, SnC3, SnD3, SoE). (For properties of Hudson soils in all these mapping units, except SoE, refer to the Hudson series.)	>8	1–2	0–10	Silt loam	ML, CL	A–7, A–6
			10–44	Silty clay loam or silty clay.	ML, CL	A–7
			44–54	Silty clay with thin lenses of silt.	CL	A–7, A–6
Scio (ScA)	>8	1–2	0–47	Silt loam	ML	A–4
			47–57	Very fine sand	SM, SC, ML, CL	A–4, A–6
Tioga (Mapped only in an undifferentiated group with Barbour soils.)	6–20+	>3	0–18	Loam	ML	A–4
			18–27	Very gravelly loam	GM, ML, CL	A–4
			27–36	Very gravelly sand	GM, GC	A–2, A–4
Tuller (TaB, TaC) (For properties of Allis soils in these mapping units, refer to the Allis series.)	1–1½	½–1	0–15	Silt loam or channery silt loam.	ML, CL	A–4, A–6
			15–20	Sandstone bedrock		
Tunkhannock (TcA, TcC, ThA, ThC, ThCK, ThD, TkC, TkD, TnF, TuA). (For properties of Chenango soils in all these units except TuA, refer to the Chenango series.)	>8	>3	0–21	Gravelly silt loam	GM, SM	A–1, A–2
			21–24	Very gravelly sandy loam.	GW, GM	A–1, A–2
Volusia (VcA, VcB, VcC, VmC [2]) (For properties of Morris and Erie soils in mapping unit VmC, refer to the respective series.)	>8	½–1	0–15	Channery silt loam and loam.	ML, CL	A–4
			15–48	Channery loam	ML, CL, GM, GC	A–4, A–6
Wayland (Wa)	>10	0–½	0–22	Silt loam and loam	ML, CL	A–4
			22–30	Gravelly loam	GM, SM, GC, SC	A–4

[1] Soils that have stony in their soil name contain from 0.15 to 1.5 cubic yards of stones per acre-foot.

TABLE 6.—*Engineering*

Soil name and symbol	Suitability as a source of—			Soil features affecting—		
	Topsoil	Granular material (sand and gravel)	Fill material	Highway location		Embankment foundations
				Vertical alinement	Cut slopes	
Alluvial land (Al)	Unsuitable	Unsuitable	Variable	Subject to flooding.	Subject to flooding.	Variable strength and compressibility.
Appleton (ApB)	Unsuitable; channery.	Unsuitable	Good; wetness may hinder use.	Seasonally high water table; bedrock may be encountered in deep cuts.	Seepage and stability of slopes; seasonally high water table.	Strength generally adequate for high embankments.

properties of soils—Continued

Percentage passing sieve— No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	Permeability	Reaction	Available water capacity	Remark
			Inches per hour	*pH*	*Inches per inch of depth*	
70–95	65–95	45–65	0. 63–2. 0	5. 0–6. 0	0. 15–0. 20	
70–85	65–80	40–70	>0. 63	5. 0–6. 0	0. 08–0. 12	
100	95–100	90–100	0. 63–2. 0	5. 6–6. 0	0. 16–0. 22	
100	100	98–100	<0. 20	6. 5–7. 2	0. 15–0. 20	
100	95–100	80–100	<0. 20	>7. 4	0. 10–0. 20	
100	95–100	85–95	0. 2–2. 0	5. 5–6. 5	0. 15–0. 20	
100	100	95–100	<0. 63	5. 5–6. 5	0. 09–0. 15	
95–100	95–100	85–100	<0. 2	>7. 4	0. 07–0. 14	
80–100	70–90	70–90	0. 63–2. 0	5. 0–6. 0	0. 15–0. 22	
90–100	90–100	40–60	>6. 3	5. 5–6. 5	0. 18–0. 22	
60–90	60–80	50–70	0. 63–2. 0	5. 0–6. 0	0. 14–0. 20	Susceptible to occasional flooding.
60–80	40–60	35–55	0. 63–2. 0	5. 0–6. 0	0. 14–0. 20	
40–70	40–60	20–40	>6. 3	5. 0–6. 0	0. 08–0. 12	
75–85	65–80	55–65	0. 63–2. 0	4. 5–5. 5	0. 16–0. 20	
35–75	20–55	15–35	0. 63–6. 3	5. 0–6. 0	0. 08–0. 10	In contrast to the typical profile, the substratum of mapping units TcA, and TcC are extremely variable and that of units TkC and TkD is poorly sorted.
30–50	20–40	5–20	>6. 3	5. 0–6. 0	--------------	
80–90	75–85	55–75	0. 63–2. 0	5. 0–5. 5	0. 17–0. 21	Stones greater than 10 inches in diameter make up 1.5 to 240 cubic yards per acre to a depth of 1 foot.
60–80	55–70	40–60	<0. 2	4. 5–6. 0	--------------	
65–85	60–80	55–70	0. 63–2. 0	6. 0–7. 3	0. 19–0. 24	Susceptible to frequent flooding.
50–75	45–50	35–45	<0. 63	7. 0–7. 5	--------------	

[2] Soils that have very stony in their soil name contain from 1.5 to 240 cubic yards of stones per acre-foot.

interpretations of soils

Soil features affecting—Continued

Building foundations	Farm ponds — Reservoir areas	Farm ponds — Embankments	Agricultural drainage	Irrigation	Diversions	Waterways
Not applicable	Subject to flooding; rapid permeability in places.	Material variable; generally very poor stability.	Not applicable	Generally not irrigated.	Subject to flooding.	Subject to flooding.
Bearing capacity generally high; compressibility generally low.	Slow permeability.	Good stability; slow permeability.	Seasonally high water table; slow permeability: cut slopes subject to seepage and sloughing.	Seasonally high water table.	Generally no adverse features.	Subject to prolonged flow.

TABLE 6.—*Engineering interpretations*

Soil name and symbol	Suitability as a source of—			Soil features affecting—		
	Topsoil	Granular material (sand and gravel)	Fill material	Highway location		Embankment foundations
				Vertical alinement	Cut slopes	
Arnot (ArC)	Unsuitable; flaggy.	Unsuitable	Good; generally low yardage per acre.	Shallow to bedrock.	Rock encountered in shallow cuts; seepage.	Strength adequate for high embankments.
Barbour and Tioga (Ba, BbB, Bg).	Ba, Bg: generally good. BbB: unsuitable; gravelly.	Variable	Fair. Ba: erodible.	Subject to flooding.	Subject to flooding; cut slopes unstable.	Variable strength and compressibility.
Basher and Middlebury (Bm).	Generally good	Variable	Fair; erodible	Subject to flooding; cut slopes unstable.	Subject to flooding; cut slopes unstable.	Variable strength and compressibility.
Burdett and Erie (BrB, BrC).	Unsuitable; channery.	Unsuitable	Good	Seasonal high water table.	Cut slopes subject to sloughing and seepage.	Strength generally adequate for high embankments.
Cattaraugus (CaD, CaE).	Unsuitable; stony.	Unsuitable	Fair; stony	Generally no adverse features.	Slopes subject to sloughing and seepage.	Strength for high embankments generally adequate.
Chippewa and Norwich (ChA, ChC, CnC).	Unsuitable; stony. CnC: very stony.	Unsuitable	Fair; stony or very stony.	High water table; bedrock may be encountered in deep cuts.	Subgrades generally wet; seepage and stability of slopes.	Strength for high embankments generally adequate.
Conesus (CoB, CoC)	Unsuitable; channery.	Unsuitable	Good	Generally no adverse features.	Slopes subject to seepage; bedrock may be encountered in deep cuts.	Strength for high embankments generally adequate.
Culvers (CuB, CuC, CuD).	Unsuitable; stony.	Unsuitable	Fair; very stony	Generally no adverse features.	Shallow to fragipan; slopes subject to sloughing and seepage above pan.	Strength for high embankments generally adequate.
Darien (DaB, DaC, DcC3, DdB, DdC, DdD, DeB, DeC, DsB3, DuC3).	DaB, DaC, DcC3, DsB3, DuC3; unsuitable; channery or cloddy. DdB, DdC, DdD, DeB, DeC: fair; low yardage per acre.	Unsuitable	Good	Seasonal high water table; bedrock may be encountered in deep cuts.	Seepage and stability of slopes.	Strength for moderately high embankments generally adequate.

of soils—Continued

Soil features affecting—Continued						
Building foundations	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
	Reservoir areas	Embankments				
High bearing capacity; bedrock encountered in moist excavations.	Shallow to bedrock.	Low yardage per acre.	Shallow to bedrock.	Generally not irrigated.	Shallow to bedrock.	Shallow to bedrock.
Subject to flooding.	Excessive seepage in dry periods.	Fair stability. BbB: subject to piping; erodible.	Cut slopes unstable; subject to flooding; natural outlets generally inadequate. BbB: subject to piping.	Subject to flooding.	Subject to flooding.	Subject to flooding.
Subject to flooding.	Rapid permeability.	Fair stability	Subject to flooding; natural outlets inadequate; cut slopes unstable.	Subject to flooding.	Subject to flooding.	Subject to flooding.
Bearing capacity generally moderately high; compressibility generally low to moderately low.	Slow to moderately slow permeability.	Good stability; slow to moderately slow permeability.	Slow to moderately slow permeability.	Moderate water intake rate; moderately high available moisture capacity; limited root depth.	Generally no adverse conditions.	Subject to prolonged flow; steeper areas erodible.
Bearing capacity generally high; compressibility low.	Moderately slow to slow permeability; steep slopes; stony.	Good stability; slow permeability when compacted; stony.	Steep slopes; stony.	Steep slopes, stony.	Steep slopes; stony.	Prolonged flow; steep slopes; stony.
Bearing capacity generally moderately high; compressibility generally low; high water table.	High water table; slow permeability; stony. CnC: very stony.	Good stability when compacted; slow permeability; stony. CnC: very stony.	Slowly permeable layer at a depth of 10 to 15 inches; slow internal drainage.	Limited root depth. CnC: very stony.	Compact layer at a depth of 10 to 15 inches; channel subject to seepage. CnC: very stony.	Subject to prolonged flow. CnC: very stony.
Bearing capacity generally moderately high; compressibility generally low.	Seasonally high water table; slow permeability. CoC: slopes.	Good stability and shear strength; slow permeability.	Slow permeability at a depth of 30 to 40 inches. CoC: slopes.	Limited root depth; generally not irrigated.	Subject to prolonged flow. CoC: slopes.	Subject to prolonged flow. CoC: erodible.
Bearing capacity generally high; compressibility low.	Slow permeability; stony. CuD: slopes.	Fair to good stability; slow permeability; stony.	Slowly permeable layer at 16 to 20 inches. CuD: slopes.	Water intake rate good; moderate to high available moisture capacity. CuD: slopes.	Compact layer at 16 to 20 inches; stony.	Subject to prolonged flow; stony. CuD: slopes.
Variable	Slow permeability; bedrock may be encountered in deep cuts. DdD: slopes.	Fair stability; slow permeability; poor workability when wet.	Internal drainage slow. DdD: slopes.	Fair water intake rate; high available moisture capacity. DdD: slopes.	Seepage and stability of slopes. DdD: slopes.	Subject to prolonged flow; erodible on steep slopes.

TABLE 6.—*Engineering interpretation*

Soil name and symbol	Suitability as a source of— Topsoil	Granular material (sand and gravel)	Fill material	Soil features affecting— Highway location: Vertical alinement	Highway location: Cut slopes	Embankment foundations
Farmington (FaB, FaF)	Poor; generally contains rock fragments.	Unsuitable	Good; generally low yardage per acre.	Shallow to limestone bedrock; frequent outcrops.	Shallow to limestone bedrock; frequent outcrops.	Strength for high embankments adequate.
Fredon and Halsey (Fh).	Unsuitable; gravelly.	Generally good	Good; highly erodible in places.	High water table.	Slopes subject to seepage and sloughing; highly erodible in places.	Strength for low embankments generally adequate.
Holly and Papakating (Ha).	Fair to good	Unsuitable	Generally unsuitable.	Subject to flooding.	Subject to flooding; cut slopes unstable.	Variable strength and stability.
Honeoye-Farmington complex (HfB, HfC).	Poor; generally contains rock fragments.	Unsuitable	Good; low yardage per acre in shallow areas.	Limestone bedrock at a depth of 6 to 40 inches.	Seepage and rock in shallow cuts.	Strength for high embankments generally adequate.
Howard (HgA, HgC)	Unsuitable; gravelly.	Generally good	Good	Generally no adverse features.	Slopes subject to sloughing and seepage; highly erodible in places.	Strength for moderately high embankments generally adequate.
Ilion and Appleton (IaB).	Fair; low yardage; may contain rock fragments.	Unsuitable	Fair to good	High water table.	Seepage and stability of slopes.	Strength for moderately high embankments generally adequate.
Ilion and Lyons (IlA, IlC).	Fair; low yardage.	Unsuitable	Lower mineral part good; upper organic part unsuitable.	High water table.	Seepage and stability of slopes.	Some unsuitable organic surface material.
Lakemont and Madalin (LaA, LdB).	Poor to fair; generally cloddy.	Unsuitable	Unsuitable	High water table.	Cut slopes unstable.	Very low strength; moderately high to high compressibility.

of soils—Continued

Soil features affecting—Continued						
Building foundations	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
	Reservoir areas	Embankments				
High bearing capacity; bedrock encountered in most excavations.	Shallow to bedrock. FaF: steep slopes.	Low yardage per acre.	Shallow to bedrock. FaF: steep slopes.	Generally not irrigated.	Frequent rock outcrops. FaF: steep slopes.	Frequent rock outcrops.
Variable stability and compressibility; large settlement possible under heavy or vibratory loads.	Stratified sand; subject to excessive seepage.	Good stability and shear strength; may be permeable.	High water table; cut slopes unstable; pockets of sand subject to piping; natural outlets frequently inadequate.	Generally not irrigated.	Depressional relief.	Depressional relief.
Not applicable	Subject to annual flooding; high water table.	Fair stability; mixed and compacted.	Subject to flooding; cut slopes unstable; pockets of sand subject to piping; natural outlets frequently inadequate.	Subject to flooding; generally not irrigated.	Subject to flooding.	Subject to flooding.
High bearing capacity; low compressibility.	Limestone bedrock at a depth of 6 to 40 inches.	Good stability; low yardage per acre.	Shallow to bedrock in places.	Honeoye soil: high water intake rate; high available moisture capacity. Farmington soil: shallow; limited root depth.	Honeoye soil: no adverse features. Farmington soil: shallow to limestone bedrock.	Honeoye soil: no adverse features. Farmington soil: shallow to bedrock; stony.
Variable stability, depending on underlying material; low compressibility; large settlement possible under heavy or vibratory loads.	Rapid permeability.	Good stability for outside shell; permeable.	Rapid permeability.	Good water intake rate; moderate to high available moisture capacity.	Rapid permeability.	Rapid permeability.
High water table; bearing capacity generally moderately high; compressibility low.	Slow permeability.	Fair to low shear strength; slow permeability; poor workability when wet.	Seasonally high water table; slow permeability at a depth of 15 to 30 inches.	Generally not irrigated.	Compact layer at a depth of 15 to 30 inches.	Subject to prolonged flow.
High water table	Slow to moderately slow permeability.	Slow permeability; surface soil high in organic-matter content; fair to low shear strength.	Slow to moderately slow permeability below a depth of 18 to 24 inches.	Generally not irrigated.	High water table. IIA: depressional relief.	High water table.
Not applicable	High water table; slow permeability.	Low shear strength; poor workability; moderate to high shrink-swell potential.	Cut slopes very unstable. LaA: natural outlets inadequate in places.	Generally not irrigated.	High water table. LaA: depressional relief.	Prolonged flow. LaA: depressional relief.

TABLE 6.—*Engineering interpretations*

Soil name and symbol	Suitability as a source of— Topsoil	Granular material (sand and gravel)	Fill material	Soil features affecting— Highway location: Vertical alinement	Highway location: Cut slopes	Embankment foundations
Lansing (LhB, LhC, LhC3).	Unsuitable; channery.	Unsuitable	Good	Generally no adverse features.	Generally no adverse features.	Strength for high embankments generally adequate.
Lordstown (LmA, LmC, LmD, LmE, LnB).	LmA, LmC: unsuitable; content of rock fragments high. LmD, LmE, LnB: poor to fair; low yardage per acre; contains fragments of shale in places.	Unsuitable	Fair to good; generally low yardage per acre.	Sandstone or rippable shale bedrock at a depth of 20 to 40 inches.	Rock encountered in shallow cuts; seepage.	Strength adequate for high embankments.
Lordstown and Oquaga (LoE). Lordstown, Oquaga and Nassau (LrF).	Unsuitable; content of rock fragments high.	Unsuitable	Fair to poor; generally low yardage per acre; very stony.	Very stony soil 20 to 40 inches deep to bedrock.	Rock encountered in shallow cuts; seepage.	Strength adequate for high embankments.
Lyons (LsB)	Fair to poor; generally contains rock; low yardage.	Unsuitable	Fair; low yardage; wet in places.	High water table; limestone bedrock at a depth of 10 to 20 inches.	High water table; bedrock may be encountered in shallow cuts.	Strength for high embankments generally adequate.
Lyons and Ilion (LyB)	Unsuitable very stony.	Unsuitable	Fair to poor; very stony; wet in places.	High water table.	High water table.	Strength generally adequate for high embankments.
Madalin (Ma)	Poor to fair; too wet in places.	Unsuitable	Unsuitable	High water table.	High water table.	Very low in upper 30 inches; moderately high to high compressibility.
Mardin (McB, McC, McC3, McD, McE).	Unsuitable; many rock fragments.	Unsuitable	Good	Generally no adverse features.	Slopes subject to sloughing and seepage.	Strength for high embankments generally adequate.
Mardin and Cattaraugus (MdF).	Unsuitable; stony.	Unsuitable	Fair to good; very stony in places.	Generally no adverse features.	Slopes subject to sloughing and seepage.	Strength for high embankments generally adequate.
Mardin and Culvers (MeE).	Unsuitable; very stony.	Unsuitable	Good to fair; stone content high.	Generally no adverse features.	Slopes subject to sloughing and seepage.	Strength for high embankments generally adequate.

of soils—Continued

Soil features affecting—Continued						
Building foundations	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
	Reservoir areas	Embankments				
Bearing capacity generally high; compressibility low.	Moderately slow to slow permeability.	Good stability and shear strength; slow permeability.	Drainage generally not needed; cut slopes erodible.	Fair to good water intake rate; high available moisture capacity.	LhC, LhC3: slopes.	Erodible on steeper slopes.
High bearing capacity; bedrock encountered in most excavations.	Bedrock at a depth of 20 to 40 inches. LmD, LmE: steep slopes.	Low yardage per acre.	Bedrock at a depth of 20 to 40 inches; drainage generally not needed. LmD, LmE: steep slopes.	Fair to good water intake rate; moderate to high available moisture capacity. LmD, LmE: steep slopes.	Sandstone or shale bedrock at a depth of 20 to 40 inches. LmD, LmE: slopes.	Sandstone or shale bedrock at a depth of 20 to 40 inches. LmD, LmE: steep slopes.
High bearing capacity; bedrock encountered in most excavations.	Very stony; bedrock at a depth of 20 to 40 inches. LoE, LrF: steep slopes.	Very stony; low yardage per acre.	Drainage generally not needed.	Not applicable	Not applicable	Very stony; bedrock at a depth of 20 to 40 inches. LoE, LrF: steep slopes.
Stable; shallow to bedrock.	Limestone bedrock at a depth of 10 to 20 inches; ledgy.	Low yardage per acre.	Shallow to bedrock.	Not generally irrigated.	Shallow to bedrock.	Shallow to bedrock.
Bearing capacity generally high; compressibility low.	High water table; slow and moderately slow permeability; very stony.	Good stability below a depth of 18 to 24 inches; slow permeability; very stony.	High water table; slow to moderately slow internal drainage; natural outlets may be lacking in nearly level areas.	Not generally irrigated.	Irregular slopes; very stony.	Very stony.
Not applicable	Slow permeability.	Low shear strength; surface layer high in organic matter.	High water table; slow internal drainage; cut slopes may be unstable.	Not generally irrigated.	Not needed	Not needed.
Bearing capacity generally high; compressibility low.	Slow permeability at a depth of 20 to 24 inches. McD, McE: steep slopes.	Good stability and shear strength; slow permeability; channery.	Compact layer at a depth of 20 to 24 inches; internal drainage slow to very slow; small areas subject to prolonged seepage. McD, McE: steep slopes.	Moderate to high available moisture capacity. McD, McE: steep slopes.	Compact layer at a depth of 20 to 24 inches. McD, McE: steep slopes.	Subject to prolonged flow. McE: steep slopes.
Bearing capacity generally high; compressibility low; very steep slopes.	Very steep slopes.	Good stability; very stony in places.	Not applicable	Generally not irrigated.	Very steep; slopes.	Very steep slopes.
Bearing capacity generally high; compressibility low.	Slow permeability; steep slopes.	Good stability; very stony.	Not applicable	Generally not irrigated.	Very stony; steep slopes.	Subject to prolonged flow; very stony; steep slopes.

TABLE 6.—*Engineering interpretations*

Soil name and symbol	Suitability as a source of— Topsoil	Granular material (sand and gravel)	Fill material	Soil features affecting— Highway location: Vertical alinement	Highway location: Cut slopes	Embankment foundations
Mohawk and Honeoye (MhC, MhC3, MhD, MhF).	Poor to fair; generally contains rock fragments; low yardage per acre.	Unsuitable	Good	Generally no adverse features.	Seepage and stability of slopes.	Strength for moderately high embankments generally adequate; till intermixed with alluvium in places.
Mohawk and Lansing (MkC, MkD).	Unsuitable; very stony.	Unsuitable	Fair; very stony.	Generally no adverse features.	Seepage and stability of slopes.	Strength for high embankments generally adequate.
Mohawk and Lima (MIB, MIB3).	Poor to fair; generally contains rock fragments; low yardage per acre.	Unsuitable	Good	Generally no adverse features.	Seepage and stability of slopes.	Strength for high embankments generally adequate.
Morris (MoB, MoC)	Unsuitable; many rock fragments.	Unsuitable	Good to fair; stony.	Generally no adverse features.	Generally good; fragipan encountered in shallow cuts; slopes subject to sloughing and seepage above pan.	Strength for high embankments generally adequate.
Muck (Ms); Muck and Peat (Mu).	Suitable as amendment for mineral soils.	Unsuitable	Unsuitable	Organic soils; high water table.	Very unstable	Very unsuitable
Nassau (NaC, NaE)	Unsuitable; rock fragments.	Unsuitable	Good; low yardage per acre.	Shallow to bedrock.	Rock encountered in shallow cuts; seepage.	Strength adequate for high embankments.
Nunda (NdB, NdC, NdC3, NdD, NdD3).	Unsuitable; channery.	Unsuitable	Good	Generally no adverse features.	Seepage and stability of slopes.	Strength for moderately high embankments generally adequate.
Nunda and Langford (NIB, NIC, NIC3, NID).	Unsuitable; channery.	Unsuitable	Good	Generally no adverse features.	Slopes subject to sloughing and seepage.	Strength for moderately high embankments generally adequate.

of soils—Continued

Soil features affecting—Continued						
Building foundations	Farm ponds: Reservoir areas	Farm ponds: Embankments	Agricultural drainage	Irrigation	Diversions	Waterways
Bearing capacity generally high; compressibility low.	Moderately slow to slow permeability; steep slopes.	Good to fair stability; slow permeability; difficult to work when wet.	Generally not needed.	Generally not irrigated.	Steep slopes	Erodible. MhD, MhF: steep slopes.
Bearing capacity generally high; compressibility low.	Moderately slow to slow permeability. MkD: steep slopes.	Very stony	Generally not needed.	Generally not irrigated.	Very stony. MkD: steep slopes.	Very stony.
Bearing capacity generally high; compressibility low.	Slow to moderately slow permeability.	Good to fair stability; slow permeability; difficult to work when wet.	Small areas subject to prolonged seepage.	Fair water intake rate; high available moisture capacity.	Generally no adverse features.	Subject to prolonged flow; erodible.
Bearing capacity generally high; compressibility low.	Seasonal high water table; slow permeability.	Good stability; slow permeability; stony.	Slowly permeable at a depth of 15 inches; internal drainage slow; may contain sand lenses subject to piping.	Limited root depth; stony.	Slowly permeable layer at a depth of 15 inches; stony.	Subject to prolonged flow; stony.
Not applicable	High water table.	Very poor shear strength and stability; high compressibility.	Very high shrinkage when first drained; depth to underlying material variable. Mu: not generally drained.	Good water intake rate and available water capacity. Mu: not applicable.	Not needed	Not needed.
High bearing capacity; bedrock encountered in most excavations.	Shallow to bedrock. NaE: steep slopes.	Low yardage per acre.	Shallow to bedrock. NaE: steep slopes.	Limited root depth. NaE: steep slopes.	Shallow to bedrock. NaE: steep slopes.	Shallow to bedrock.
Bearing capacity generally moderately high; compressibility low.	Moderately slow to slow permeability. NdD, NdD3: steep slopes.	Good to fair stability; slow permeability.	Small wet areas subject to prolonged seepage. NdD, NdD3: steep slopes.	Moderate water intake rate; high available moisture capacity. NdC3, NdD3: limited root depth. NdD, NdD3: steep slopes.	NdD, NdD3: steep slopes.	Subject to prolonged flow; erodible on steep slopes. NdD, NdD3: steep slopes.
Bearing capacity generally moderately high; compressibility low.	Moderately slow to slow permeability. NlD: steep slopes.	Fair to good stability; slow permeability.	Slowly permeable layer at variable depths; internal drainage slow. NlD: steep slopes.	Moderate water intake rate; moderate to high available moisture capacity. NlC3: limited root depth. NlD: steep slopes.	NlD: steep slopes.	Subject to prolonged flow; erodible on steep slopes. NlD: steep slopes.

TABLE 6.—*Engineering interpertations*

Soil name and symbol	Suitability as a source of—			Soil features affecting—		
	Topsoil	Granular material (sand and gravel)	Fill material	Highway location		Embankment foundations
				Vertical alinement	Cut slopes	
Odessa and Rhinebeck (OdA, OdB, OdC, OrC3).	OdA, OdB, OdC: fair; low yardage per acre. OrC3: unsuitable; cloddy.	Unsuitable	Good when dry	Seasonally high water table.	Subgrades and cut slopes generally unstable.	Strength for low embankments generally adequate.
Oquaga (OsC, OsD, OsE).	Unsuitable; stony.	Unsuitable	Generally good; but generally low soil yield per acre; stony.	Moderately deep to bedrock.	Rock encountered in shallow cuts; seepage.	Strength adequate for high embankments.
Phelps (PhA, PlB)	Unsuitable; gravelly.	PhA: generally good. PlB: poor.	PhA: good; highly erodible in places. PlB: clayey at a depth of 24 to 36 inches.	Seasonally high water table.	PhA: seepage; cut slopes unstable. PlB: cut slopes and subgrade unstable; seepage.	Strength for low embankments generally adequate.
Red Hook (Rh)	Unsuitable; gravelly.	Generally good	Good; highly erodible in places.	Seasonally high water table.	Cut slopes and subgrade unstable; seepage.	Strength for low embankments generally adequate.
Scio (ScA)	Fair; low yardage per acre.	Unsuitable	Fair to good	Seasonally high water table.	Cut slopes and subgrade unstable; seepage.	Strength for low embankments generally adequate.
Schoharie and Hudson (ShB, ShC, SnB3, SnC3, SnD3, SoE).	ShB, ShC: fair; low yardage per acre. SnB3, SnC3, SnD3, SoE: poor; cloddy.	Unsuitable	Good when dry	Seasonally high water table.	Cut slopes and subgrades unstable; seepage.	Strength for low embankments generally adequate.
Tuller and Allis (TaB, TaC).	Fair; low yardage per acre.	Unsuitable	Good; generally low yardage per acre.	Sandstone or shale bedrock at a depth of 10 to 20 inches; seasonally high water table.	Rock encountered in shallow cuts; seepage.	Strength adequate for high embankments.

of soils—Continued

Soil features affecting—Continued						
Building foundations	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
	Reservoir areas	Embankments				
Bearing capacity generally low; compressibility variable.	High water table; slow permeability.	Poor stability; subject to shrinking and swelling.	High water table; cut slopes unstable; internal drainage slow.	Seasonally high water table.	Erodible	Subject to prolonged flow; very erodible.
High bearing capacity; bedrock encountered in most excavations.	Moderately deep to bedrock. OsD, OsE: steep slopes.	Good stability; low yardage per acre; stony.	Generally not needed.	Fair to good water intake rate; moderate to high available moisture capacity. OsD, OsE: steep slopes.	Bedrock at a depth of 20 to 40 inches; rock crops out in places; stony. OsD, OsE: steep slopes.	Bedrock at a depth of 20 to 40 inches; stony. OsD, OsE: steep slopes.
Bearing capacity and compressibility variable; large settlement possible under heavy or vibratory loads.	PhA: stratified sand and gravel; subject to excessive seepage. PlB: slow permeability below a depth of 24 to 36 inches.	PhA: good stability; variable permeability. PlB: low shear strength; poor workability.	PhA: cut slopes unstable; sandy layers subject to piping. PlB: cut slopes unstable; clayey at a depth of 24 to 36 inches.	PhA: Moderate to high water intake rate. PlB: Generally not irrigated.	PhA: generally not needed. PlB: clayey to a depth of 24 to 36 inches.	PhA: erodible. PlB: erodible; clayey at a depth of 24 to 36 inches.
Bearing capacity generally low; compressibility variable; large settlement possible under heavy or vibratory loads.	Moderate to rapid permeability.	Good stability; slow permeability when compacted.	Cut slopes unstable; stratified sand; subject to piping; natural outlets inadequate in places.	Not generally irrigated.	Level relief	Level relief.
Variable strength and compressibility.	Stratified sands subject to excessive seepage.	Low shear strength.	High water table; cut slopes unstable; layers of fine sand; subject to piping.	Water intake rate fair to good; high available moisture capacity.	Level relief	Level relief.
Bearing capacity generally low; compressibility variable.	Slow permeability. SnD3, SoE: steep slopes.	Low shear strength; subject to shrinking and swelling; poor workability.	Seasonally high water table; silt layers subject to piping; cut slopes unstable; internal drainage slow. SnD3, SoE: steep slopes.	Water intake rate fair; moderate to high available moisture capacity. SnD3, SoE: steep slopes.	Seasonally high water table; irregular slopes. SnD3, SoE: steep slopes.	Prolonged flow; highly erodible. SnD3, SoE: steep slopes.
High bearing capacity; bedrock encountered in most excavations.	Sandstone or shale bedrock at a depth of 10 to 20 inches.	Sandstone or shale bedrock at a depth of 10 to 20 inches; low yardage per acre.	High water table; sandstone or shale bedrock at a depth of 10 to 20 inches.	Not generally irrigated.	Sandstone or shale bedrock at a depth of 10 to 20 inches.	Sandstone or shale bedrock at a depth of 10 to 20 inches.

TABLE 6.—*Engineering interpretations*

Soil name and symbol	Suitability as a source of— Topsoil	Granular material (sand and gravel)	Fill material	Soil features affecting— Highway location: Vertical alinement	Highway location: Cut slopes	Embankment foundations
Tunkhannock and Chenango (TcA, TcC, ThA, ThC, ThCK, ThD, TkC, TkD, TnF, TuA).	Unsuitable; gravelly or cloddy.	ThA, ThC, ThCK, ThD, TuA: generally good. TcA, TcC, TkC, ThD: fair to poor; poorly sorted. TnF: poor to good; poorly sorted in places.	Good; highly erodible in sandy areas.	Generally no adverse features.	Slopes subject to sloughing and seepage; highly erodible in sandy areas.	Strength for moderately high embankments generally adequate.
Volusia (VcA, VcB, VcC).	Unsuitable; channery.	Unsuitable	Good when dry	Seasonally high water table.	Subgrade may be wet; slopes subject to sloughing and seepage.	Strength for high embankments generally adequate.
Volusia, Morris and Erie (VmC).	Unsuitable; very stony.	Unsuitable	Generally fair; very stony.	Seasonally high water table.	Seepage and sloughing in cuts; subgrade may be wet.	Strength for high embankments generally adequate.
Wayland (Wa)	Generally good; wetness may hinder use.	Unsuitable	Generally unsuitable.	Subject to flooding.	Subject to flooding	Variable strength.

MOISTURE-DENSITY RELATIONS: If soil material is compacted at a successively higher moisture content, assuming that the compactive effort remains constant, the density of the compacted material increases until the optimum moisture content is reached. After that, the density decreases with an increase in moisture content. The highest dry density obtained in the compaction test is termed maximum density. The moisture-density relationship is important in earthwork, for, as a rule, optimum stability is obtained if the soil material is compacted to about maximum density when it is about at optimum moisture content.

PLASTIC LIMIT: The moisture content at which the soil material passes from a semisolid to a plastic state.

SHRINKAGE LIMIT: The moisture content of soil material at which no further shrinkage occurs.

SHRINK-SWELL POTENTIAL: An indication of the volume change to be expected of the soil material with changes in moisture content.

Engineering classification systems

Engineers generally classify soils according to a system approved by the American Association of State Highway Officials (AASHO) (*2*) or according to the Unified classification system (*17*). Agricultural scientists, in classifying soil texture, use the U.S. Department of Agriculture (USDA) system. In the USDA system the textural classes are made according to size distribution of mineral particles less than 2 millimeters in diameter. Soils in which 15 percent or more of the soil mass consists of particles larger than 2 millimeters have an adjective term added to the textural class, for example, gravelly, shaly, or flaggy. The USDA textural classes are described in the Soil Survey Manual (*15*). In some ways this system of classification is comparable to the two systems generally used by engineers.

Most highway engineers classify soil materials in accordance with the AASHO system. This system is based on field performance in relation to particle-size distribution, liquid limit, and plasticity index of soil materials. All mineral soils having about the same general load-carrying capacity are grouped into seven basic groups, though the range in load-carrying capacity within each group is wide and there is an overlapping in load-carrying capacity from one group to another. The groups range from A-1, the best soil for subgrade, to A-7, the poorest for subgrade. The relative engineering value of each group is indicated by an index number that ranges from 0 for the best to 20 for the poorest.

A detailed discussion of the AASHO system can be found in the Highway Research Board *Proceedings of the Twenty-Fifth Annual Meeting*, 1945, pages 375 to 392.

Some engineers prefer to use the Unified soil classification system. In this system the soils are identified according to their texture and plasticity and are grouped according to their performance as engineering con-

of soils—Continued

Soil features affecting—Continued						
Building foundations	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
	Reservoir areas	Embankments				
Bearing capacity variable; large settlement possible under heavy or vibratory loads.	Rapid permeability; subject to excessive seepage. ThD, TkD: steep slopes. TnF: very steep slopes.	Good shear strength and stability; permeable in places. TuA: rapid permeability.	Cut slopes unstable; sand generally not needed.	Good water intake rate; low to moderate available moisture capacity. ThD, TkD: steep slopes. TnF: not applicable; very steep slopes. TuA: low available water capacity; droughty.	Rapid permeability; gravelly or cobbly. ThCK: irregular relief. ThD, TkD: steep slopes. TnF: not applicable; very steep slopes.	Rapid permeability; erodible on steep slopes. ThD, TkD: steep slopes. TnF: very steep slopes.
Bearing capacity generally high; compressibility low.	Seasonally high water table; slow permeability.	Very good stability; slow permeability.	Slowly permeable layer at a depth of 8 to 10 inches; seepage.	Generally not irrigated.	Subject to prolonged flow.	Subject to prolonged flow.
Bearing capacity generally high; compressibility low.	Seasonally high water table; slow permeability; very stony.	Very good stability; slow permeability; very stony.	Generally not needed.	Generally not irrigated.	Subject to prolonged flow; very stony.	Subject to prolonged flow; very stony.
Not applicable----	Subject to flooding; moderate to rapid permeability.	Good stability; slow permeability when compacted.	Subject to flooding; natural outlets inadequate; cut slopes unstable.	Generally not irrigated.	Subject to flooding.	Subject to flooding.

struction material. Two letters are used to designate each of 15 possible classes. The letters G, S, C, M, and O stand for gravel, sand, silt, clay, and organic material, respectively; and the letters W, P, L, and H refer to well graded, poorly graded, low liquid limit, and high liquid limit, respectively. The designation SM, for example, shows sand mixed with silt, and ML shows silt that has a liquid limit less than 50. In like manner, the designation MH or CH shows silt and clay that have a liquid limit of more than 50.

Engineering test data and interpretations

Samples were taken at 14 different locations from five extensive soil series and tested according to standard procedures. The results of these tests are given in table 4. These soils formed in highly variable glacial till or in water-deposited material. Because the range in texture, or grain size, of some of this material is fairly wide, the classification given in table 4 may not apply to all places where the soil was mapped, but it applies to the representative soil in the mapping unit. Also, for the classification in table 4 the particles larger than 3 inches across were discarded. Most of the soils were tested to depths of less than 6 feet; consequently, the data cannot be used for estimating soil characteristics below that depth.

Table 5 lists the estimated properties of soils that are significant to engineers. The test data shown in table 4, together with information in the section "Descriptions of the Soils," and with knowledge obtained through experience in engineering construction, were used in estimating these properties. Because only a few soils in the county were tested, the properties for the rest of the soils listed in table 5 are estimates.

In table 6 are given suitability ratings for soils as a source of topsoil, sand, gravel, and fill material and features of soils that affect stated engineering practices. Some of the practices listed in table 6 are those that affect soil and water conservation, such as farm ponds, drainage systems, irrigation, diversion terraces, and waterways. The interpretations given in table 6 are intended to provide guidelines for the use of soils in engineering and to indicate potential hazards that require unusual procedures or special precautions in planning engineering works.

The suitability of soils as a source of topsoil, granular material, and fill material is rated in table 6 as *good*, *fair*, *poor*, or *unsuitable*.

Topsoil.—The texture, depth, and content of organic matter of the soil were used mainly in determining the suitability ratings for topsoil. For example, a soil is rated *good* if it has silt loam or loam texture, is free of rock fragments, and is high in organic-matter content. In contrast, a clayey soil or one that contains many rock fragments is rated *unsuitable*. Medium-textured alluvial soils generally are the most suitable as a source of topsoil.

Granular material.—The suitability of soils for granular material (sand and gravel) depends mainly on the texture and arrangement of the material in the substratum. Well-sorted glacial outwash and some alluvial material are the best sources of sand and gravel in Schoharie County.

Fill material.—Fill material is used mainly in dams, pavement bases, highway embankments, parking lots, and similar structures. The selection of fill material should be determined by the use. The more important soil features to be considered are texture, stoniness, permeability, compressibility, shrink-swell potential, organic-matter content, and moisture content.

Highway location.—The more important features that influence the location of highways are texture, organic-matter content, permeability, drainage compressibility, slope, depth to bedrock, hazard of flooding, bearing capacity, stability after compaction, and shrink-swell potential. Most soils of the uplands have a dense, slowly permeable fragipan or panlike layer in the lower part. Where possible, the gradeline should be planned to avoid cutting into or out of these pan layers.

Embankment foundations.—Among the important soil features that determine the use of soils as embankment foundations are texture, bearing capacity, compressibility, stability, drainage, and depth to bedrock. Most soils that developed in deep glacial till provide good embankment foundations, but those that developed in glacial outwash, lacustrine sediments, and alluvium are variable. Peat and muck are unsuitable and should be avoided where possible.

Foundations of buildings.—Among the features that affect use of soils for foundations are drainage, slope, hazard of flooding, bearing capacity, susceptibility to frost action, and shear strength. If foundations for large buildings are to be constructed, detailed subsurface investigation is necessary and a design based on the investigation. A general subsurface investigation may suffice for residences and light commercial buildings. Basement seepage is the most conspicuous and troublesome problem in building foundations on soils of Schoharie County. In most places foundation drains and proofing against dampness and seepage are necessary.

Farm ponds.—The reservoir area of ponds depends on the ability of the soil to hold water. Except in areas where the water table is near the surface, rapidly permeable material, such as sand and gravel, generally have severe limitations as reservoir areas. Most soils that formed in glacial till have impeded permeability and are suitable, but in places they have sandy or gravelly layers that allow excessive seepage. Embankments for the impoundment of water depend on the ability of compacted soil material to stop the flow of water. Poorly graded sandy and silty materials disperse readily and are subject to piping. These materials should be avoided in building embankments.

Agricultural drainage.—The main soil features that affect agricultural drainage are texture, permeability, height of the water table, depth to bedrock, slope, stability, and the hazard of flooding. In Schoharie County most poorly drained soils of the uplands have a dense fragipan or panlike layer that retards the movement of water. Both surface and subsurface interception drains may be needed. Lenses of sand and gravel occur in some soils that developed in glacial till. These lenses cause piping and instability of drainage structures. Soils that developed in water-laid material contain layers of poorly graded silt, fine sand, or sand in places. These layers adversely affect open ditches and subsurface drains. Unless subsurface drains on these soils are protected, they may become plugged with silt and fine sand.

Irrigation.—The main soil features that affect irrigation are drainage, permeability, infiltration rate, available moisture capacity, thickness of the root zone, slope, and erodibility. Soils that developed in gravelly or sandy glacial outwash normally are droughty and have moderate to low available moisture capacity. Some soils that developed in glacial till and soils that are shallow to bedrock have layers near the surface that impede the movement of water and restrict penetration by roots. If sloping areas of erodible soils are irrigated, measures are needed that control erosion.

Diversions.—The important features that affect the building of diversions are slope, permeability, depth to bedrock or other impervious material, stability, and erodibility. Where diversions are built in soils that have a slowly permeable layer, the diversions should be deep enough to prevent seepage along the top of the layer. Piping may occur where sandy or silty layers are cut in building of diversions, and the layers are also subject to eroding, sloughing, and slumping.

Waterways.—The same soil features that affect diversions also affect waterways. Where waterways are constructed in soils having a shallow, slowly permeable layer, prolonged seepage is likely. This seepage makes the establishment and maintenance of protective vegetation difficult.

Engineering properties of geologic deposits

The following geologic units occur in Schoharie County: Glacial till, glacial outwash, lacustrine sediments, alluvium, muck, and peat. Most of these geologic units have engineering significance that generally differs from that of other geologic units. Each of these units is described in the following paragraphs, and its broad engineering significance is given. Except for use as topsoil, reference to use of any unit is assumed to refer to the materials that underlie the surface layer. Where the use is for topsoil, only the surface layer generally is considered.

Glacial till consists of nonsorted, nonstratified soil and rock materials transported and deposited by glacial ice. Till generally is a heterogenous mass of dense, compact, unconsolidated material that has been strongly influenced by the underlying bedrock and preglacial soil materials. These materials range in size from boulders to clay. In places where some sorting by water has occurred, the till is less dense and has pockets of sand, silt, clay, and gravel. Soil scientists classify till that is more than 40 inches thick as deep, but some areas of shallow till can be expected in soils that generally formed in deep till, especially in steep areas.

DEEP GLACIAL TILL

In Schoharie County the soils that formed in deep glacial till are in the Appleton, Burdett, Cattaraugus, Chippewa, Conesus, Culvers, Darien, Erie, Honeoye, Ilion, Langford, Lansing, Lima, Lyons, Mardin, Mohawk, Morris, Norwich, Nunda, and Volusia. The Mardin, Volusia, Chippewa, Cattaraugus, Culvers, Morris, Norwich, Honeoye, Lima, Lansing, Conesus, Appleton, and

Lyons soils developed in acid or calcareous till primarily from sandstone, siltstone, or limestone materials and some shale. This till is dense and is coarser textured than that derived primarily from shale. The content of flagstones and boulders is generally high, and the excavation and placement of the material in embankments are difficult in places. In general, this till provides stable subgrades, good embankment foundations, and, with proper treatment, stable cut slopes for highways. This till also furnishes good foundation support for buildings.

The Mohawk, Darien, and Ilion soils developed in calcareous till primarily from shaly and clayey materials and some limestones and sandstone. This till is finer textured than that derived mainly from sandstone, siltstone, or limestone. It has more clay and fewer boulders and coarse fragments than the coarser textured till. North of a limestone escarpment and in the valley of Cobleskill Creek, the till from which the Darien and Ilion soils were derived commonly contains pockets of lacustrine clay. The use of this till is similar to use of other fine-textured till, but stability may be a problem in deep highway cuts. These finer textured materials are more susceptible to frost heaving than the coarser textured till, and they lose strength seasonally when the moisture content is increased by thawing. A base of granular material generally is needed beneath highway pavements and parking lots.

The Nunda, Langford, Burdett, and Erie soils occur in the northern part of the county. In this part two different deposits of till are closely associated. The Langford and Erie soils developed in the uppermost deposit where it is 30 inches or more thick. This deposit is silty and is dominated by materials from sandstone and siltstone. This till is similar to and behaves much the same way as the till underlying the Mardin and Volusia soils. The lower deposit is shaly and clayey. The Darien soils normally form in this material, but where the silty upper till is 15 to 30 inches thick over the lower more clayey till, the Nunda and Burdett soils developed in the two deposits. The Nunda, Langford, Burdett, and Erie soils may occur on the same landform, and an evaluation of properties of these soils generally should be based on the more clayey lower till.

THIN GLACIAL TILL

Thin glacial till is similar to deep till, but the depth to bedrock generally is less than 40 inches. Except for a few places, the till has weathered and the friable material of the solum extends to bedrock. Rock fragments are common in the soil mass, and, even in light grading operations, bedrock generally is encountered in cuts. Thin glacial till occurs on nearly level to very steep slopes. Soils formed in thin glacial till are in the Allis, Arnot, Farmington, Lordstown, Nassau, Oquaga, and Tuller series.

The Allis and Nassau soils formed in thin till over shale. The shale generally can be excavated with modern equipment. The Farmington soils are less than 20 inches deep over hard limestone. The Arnot, Lordstown, Oquaga, and Tuller soils generally are shallow over hard sandstone or siltstone, but Lordstown silt loam is over soft shale. Areas of ledges, gorges, and rockland were not mapped separately in this county, but small areas commonly occur among these soils.

The gradeline of highways requires careful judgment on soils in thin till or in rocky areas where slopes are nearly level. Unless the gradeline is moderately high, drainage ditches must be blasted in the bedrock, and deep cuts involve rock excavation. The cut slopes may require special design, depending on the structure and degree of weathering of the bedrock. Infiltration of water between the pavement and the underlying rock in cuts is a common cause of frost heaving, and highways must be designed to control this infiltration. Highway gradelines frequently run into and above bedrock in cuts, so that particular attention must be given to the use of transition sections between cuts and fills.

Of the Honeoye-Farmington complex, the Honeoye soils formed in deep till and the Farmington soils in thin glacial till. The engineering considerations indicated for each kind of till must be used for these soils after the thickness of the till has been determined by onsite investigation.

GLACIAL OUTWASH

The term glacial outwash, as used in this survey, includes all gravelly materials that have been sorted and deposited by meltwater from glaciers. These deposits formed outwash terraces, kames, kame moraines, deltas, eskers, and fans. In Schoharie County the soils that formed in glacial outwash are in the Chenango, Fredon, Halsey, Howard, Phelps, Red Hook, and Tunkhannock series.

A great amount of sorting and stratification of materials generally is evident on outwash terraces and deltas. Kames, kame moraines, and eskers may contain an excessive amount of fines; sorting may be poor to excellent; and the materials in successive layers may vary greatly in texture. Stratification generally is horizontal, but it is irregular or disrupted in places. Stratification of material in outwash fans also is variable. Lenses of silt and clay occur in many places, especially in the substratum of the moderately well drained Phelps soils, the somewhat poorly drained Fredon and Red Hook soils, and the poorly drained and very poorly drained Halsey soils. Cementing of material, generally by secondary lime, occurs in some deposits.

Some glacial outwash consists of extensive flat terraces. On these terraces are the well-drained Tunkhannock, Chenango, and Howard soils, which generally furnish excellent locations for highways and other developments. Impoundment of water is difficult. In most places these terrace soils are free of large stones and generally furnish stable material for subgrades. In some places they are underlain by wet, soft, weak silt and clay, and this possibility must always be considered on all sites of proposed heavy fills and structures. In gently sloping to steep areas, considerable grading is needed for highways and other facilities.

Glacial outwash generally has a high rate of infiltration except where layers of silt and clay occur. These layers retard internal drainage. If these layers are cut by a highway gradeline or are near the top of a subgrade cut, damage by frost heave occurs. For highways and other paved areas, undercutting is necessary to prevent frost heave and to provide uniform subgrade support. Glacial outwash may be used for various engineering purposes, depending on gradation, soundness, and plasticity. These purposes are fill material for underwater placement; ordinary fill material; strengthening material for unstable subgrade; subbase for pavements; wearing surface for driveways; sur-

face material for parking lots and some low-class roads; material for highway shoulders; free-draining, granular backfill for structures and pipes; abrasive for control of ice on highways; and soil amendments. Because drainage is good, it is generally necessary to add water to outwash material for good compaction. On the slopes of sandy cuts and fills and on ditchbanks, measures are needed that control erosion.

LACUSTRINE SEDIMENTS

Glacial ice and debris blocked the valley of Schoharie Creek for a considerable period and eventually formed lakes in the main valley and in the valleys of tributary streams. The sediments deposited in these lakes, commonly called bottom sediments by engineers, were dominantly of varved clays, but in places lenses of fine sand and silt are interbedded. In Schoharie County the soils that developed in these clayey lacustrine sediments are in the Hudson, Lakemont, Madalin, Odessa, Rhinebeck, and Schoharie series. A few small areas of soils developed in very fine sand and silt and were included in mapping. Lacustrine sediments generally are deep, but in places the Madalin soils are less than 40 inches deep over dense glacial till.

Lacustrine sediments occur on nearly level to steeply sloping, dissected terraces. These sediments are extremely erodible, even on slight grades. Whenever they occur on steeply sloping fronts of terraces, erosion is severe and landslides are numerous. Infiltration is restricted, and where relief is nearly level, runoff is very slow. Wetness generally increases with increasing depth.

Because they are weak and drainage is difficult, lacustrine sediments are more difficult to use in engineering works than any other mineral soil material in the county. Highway gradelines must be kept high, and sites for high embankments and heavy buildings must be investigated thoroughly for strength, settlement characteristics, and height of the water table. These sediments are highly susceptible to frost action, and they lose strength seasonally when the moisture content is increased by thawing. They are difficult to work when wet. A base course of granular material is needed beneath highway pavements and parking lots. Where crushed stone or gravel is used for a base course, consideration must be given to use of a course of sand as a filter under the gravel or stone. This filter will prevent the movement of the fine-textured lacustrine sediment into the base course.

A blanket of granular material can be used on cut slopes to prevent sloughing, or the cuts can be made less sloping. In building embankments the moisture content of the clayey materials should be carefully controlled. In most places foundations are poor, and considerable settlement occurs under heavy loads and structures. Foundations of bridges and buildings probably will require piles for support unless the loads are light. During wet periods trafficability over these fine-textured soils is difficult.

ALLUVIUM

Alluvium consists of sediments deposited on land by streams. In Schoharie County the soils that developed in alluvium are in the Barbour, Basher, Holly, Middlebury, Papakating, Tioga, and Wayland series. The flood plain may be at different levels, especially along Schoharie Creek. Although these levels were not shown separately in mapping, the lower lying areas generally are flooded more frequently and have more recent accumulations of alluvium than the higher lying areas. Depth to the water table fluctuates with the level of the surface of the adjacent stream.

The gradeline of a highway on alluvium should be high to prevent flooding. A safe height is above the highest flood of record. Conditions for building foundations are extremely variable. In places adjoining layers vary appreciably, and material at the surface may have little or no resemblance to material deep in the profile. For example, in some places on the flood plain of Schoharie Creek the alluvium is over lacustrine sediments. In general, alluvium is loose or soft and may contain much organic matter in the surface or subsurface layer. Where bridges or approaches to bridges are built on alluvium, special investigation and design are needed. Also, the frequency of flooding should be carefully considered before planning land developments or permanent buildings on a flood plain. Disposal of sewage effluent by leaching generally is not practical on most alluvial soils because of a seasonal or permanent high water table. Also, a sewage disposal system on this soil may contaminate domestic water supplies.

PEAT AND MUCK

Peat and muck consist of well-decomposed and partially decomposed plant and animal remains that are at least 18 inches or more thick over mineral materials. In places peat and muck are underlain by marl; by soft, wet, compressible sand, silt, and clay; or, in a few places, by dense glacial till.

The organic deposits mapped in Schoharie County were muck and peat, strongly acid, and muck, slightly acid. Spots of muck occur in areas of most poorly drained and very poorly drained mineral soils, such as the Chippewa, Norwich, Lyons, Ilion, Halsey, Lakemont, Madalin, and Papakating soils.

Because they are highly compressible and unstable, peat and muck soils generally are unsuitable as sites for highways and other embankments. As a rule, if areas of these organic soils cannot be bypassed, all the highly organic material should be removed and replaced with suitable mineral material. The organic material can be used to topdress cut slopes and fills. For construction of highways, the material that is below the water level should be replaced by granular material or broken rock. No method of construction on organic soils will entirely eliminate settlement after construction. The gradeline of highways on these organic soils must be appreciably above the highest expected flood stage.

Nonfarm Uses of Soils

This subsection was prepared to aid planners, developers, and others who are interested in the nonfarm uses of soils. It indicates the suitability of each soil in the county for specified community developments and recreational uses. An estimate of the degree and kind of limitation of each soil for specified nonfarm uses is given in table 7. The geographic location, accessibility, water supply, esthetic value, and other features also need to be considered.

The ratings in table 7 are based on the main soil features that affect nonfarm uses. The ratings are *slight*, *moderate*,

and *severe*. These ratings are relative, however, and do not preclude the use of any soil for the uses listed in the table, provided that it is economically feasible to overcome the limitation or hazard. Also, the ratings do not eliminate the need for investigation for a specified use at the site of the proposed works. If the limitation in table 7 is rated severe or moderate, one or more limitations for the use specified are listed. A rating of *slight* indicates that the soil has few or no limitations. A rating of *moderate* indicates that the soil has limitations that are moderately easy to overcome. If the rating is *severe*, the limitations are serious and overcoming them difficult. Because soil fertility is discussed in the section "Descriptions of the Soils," it is not considered in rating the soils in table 7. Also, the corrosion potential was not considered in ratings for pipeline installations.

The main soil features that affect nonfarm uses of soils are listed for the specified use. These features are flooding, seasonal wetness, slope, erosion hazard, depth to bedrock, permeability, stability, stoniness, and surface soil texture. Some nonfarm uses are affected little by any one of these features, and other uses are affected by several. The ratings in table 7 are based on the feature that produces the strongest effect for a specified use.

In the following paragraphs, the features that affect nonfarm uses of soils are listed, and their effect on specified uses is described.

Soils subject to *flooding* have severe limitations for use as sites for septic tank effluent disposal, foundations for houses, streets and parking lots, and sanitary landfill. If these soils cannot be protected by dikes, levees, or other flood prevention structures, they should not be used for these purposes. Other uses that may be slightly or moderately affected by infrequent flooding during periods of use are pipeline installations, landscaped lawns and golf courses, campsites without permanent buildings, and picnic and play areas.

Seasonal wetness affects the use of some soils in Schoharie County. The Chippewa, Norwich, Ilion, Lakemont, Halsey, Muck and Peat, Holly, and Papakating soils are wet most of the year. These soils have severe limitations for all nonfarm uses except pipeline installations and some parts of ski areas. Generally, these soils occur in depressions; and, though most areas are small, they are scattered widely throughout the county. Some soils that are wet part of the year have a seasonally perched water table above a restricting layer, or a water table that rises and falls without reaching the surface. These wet soils are not readily recognized. They include the somewhat poorly drained Appleton, Burdett, Erie, Darien, Volusia, and Morris soils on uplands, and the lake-laid Odessa and Rhinebeck soils. These extensive soils have moderate to severe limitations for many community and recreational uses.

Slope affects the use of soils for most community and recreational purposes. For example, Barbour and Tioga soils are nearly level and have no limitations, except for ski slopes. Although level areas are needed at ski resorts for suitable parking lots, the ratings of soils for ski slopes apply only to the trails. Soils that have steep slopes have severe limitations for most community and recreational uses. Even in these situations, the cost of overcoming the limitations is often justified. On the basis of slopes, the moderately sloping soils are rated according to the amount of earthmoving that is required for a particular use.

Erosion is a hazard on sloping soils. It is especially important in areas used for landscaping and in picnic and play areas. Among the soils of the county on which erosion is important to nonfarm uses are the Schoharie, Hudson, Odessa, and Rhinebeck.

Depth to bedrock affects many nonfarm uses of soils, especially where excavating or land leveling is needed. Excavating and leveling are particularly needed for septic tanks, basements, streets and parking lots, landscaping, and campsites. Establishing vegetation is difficult on soils that are shallow to bedrock; consequently, these soils are poor for athletic fields and for most other intensive uses. Bedrock generally is encountered between a depth of 12 and 20 inches in the Arnot, Farmington, Nassau, Tuller, and Allis soils and between 20 and 40 inches in the Lordstown and Oquaga soils. The acreage of soils that are shallow or moderately deep over bedrock is extensive and is widely scattered throughout the county.

Permeability refers to the rate at which water passes through the soil or soil layers and is expressed in inches per hour. Permeability is important in rating soils for septic tank effluent disposal. It is closely related to the depth to the fragipan, clay layer, or dense till layer that occurs in most of the deeper soils on uplands and the finer textured soils in lake-laid material. Limitations of soils that have rapid permeability are rated slight for septic tank disposal systems; and those of soils that have slow or moderately slow permeability, less than 0.63 inch per hour, are rated severe. Although limitations of soils that have rapid permeability generally are rated slight for septic effluent disposal, there is a risk of contaminating nearby water supplies.

Stability is a term used to express the ability of soils to support a static load and to resist sloughing in cuts. Most soils in Schoharie County are stable or at least fairly so. They are at least stable when saturated with water. The most unstable soils are the finer textured lacustrine soils—Schoharie, Hudson, Odessa, Rhinebeck, Lakemont, and Madalin. Other soils that are unstable, but to a lesser degree, are the Darien, Nunda, Burdett, and Ilion. These soils were derived from clayey glacial till that, in many places, contained a fair amount of reworked lake-laid clay. Stability is important in planning any structure involving soil. Engineering investigations at the site are needed for large structures, especially those on Schoharie, Tunkhannock, Chenango, Barbour, and other soils that formed in water-laid sediments. These soils may have subsurface layers that are not suitable for some kinds of loads.

Stoniness limits use of soils for some community and recreational purposes. Very stony soils and soils on steeper slopes that have stones larger than 10 inches in diameter and that occupy 1.5 to 240 cubic yards per acre-foot generally have stony or very stony as part of their name. Mardin, Volusia, Lordstown, Oquaga, Cattaraugus, Culvers, and Morris are the most extensive very stony soils in the county. The very stony soils occur commonly in the high plateau areas in the southern part of the county. These soils have severe limitations for most nonfarm uses.

TABLE 7.—*Estimated degree and kind of*

Map symbol	Soil	Community developments: Homesites	Septic tank effluent	Sanitary landfill	Landscaping	Streets and parking lots
Al	Alluvial land	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.
ApB	Appleton channery silt loam, 2 to 8 percent slopes.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: seasonal wetness.	Moderate: seasonal wetness; slopes.
ArC	Arnot flaggy silt loam, 0 to 15 percent slopes.	Severe: bedrock at depth of 1½ feet.	Severe: bedrock at depth of 1½ feet.	Severe: bedrock at depth of 1½ feet.	Severe: bedrock at depth of 1½ feet.	Severe: slopes; bedrock at depth of 1½ feet.
Ba	Barbour and Tioga fine sandy loams.	Moderate or severe: occasional flooding.	Severe: occasional flooding.	Severe: occasional flooding.	Slight or moderate: occasional flooding.	Slight to severe: occasional flooding.
BbB	Barbour and Tioga gravelly loams, fans, 0 to 8 percent slopes.	Moderate or severe: occasional flooding.	Severe: occasional flooding.	Severe: occasional flooding.	Slight: occasional flooding.	Slight to severe: occasional flooding; slopes.
Bg	Barbour and Tioga loams.	Moderate or severe: occasional flooding.	Severe: occasional flooding.	Severe: occasional flooding.	Slight: occasional flooding.	Slight to severe: occasional flooding.
Bm	Basher and Middlebury silt loams.	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.	Slight or moderate: frequent flooding.	Severe: frequent flooding.
BrB	Burdett and Erie channery silt loams, 3 to 8 percent slopes.	Moderate: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: seasonal wetness.	Moderate: seasonal wetness; slopes.
BrC	Burdett and Erie channery silt loams, 8 to 15 percent slopes.	Moderate: seasonal wetness; slopes.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: seasonal wetness; slopes.	Severe: slopes.
CaD	Cattaraugus stony silt loam, 15 to 25 percent slopes.	Severe: slopes.	Severe: slopes.	Severe: slopes.	Severe: slopes.	Severe: slopes.
CaE	Cattaraugus stony silt loam, 25 to 35 percent slopes.	Severe: slopes.	Severe: slopes.	Severe: slopes.	Severe: slopes.	Severe: slopes.
ChA	Chippewa and Norwich stony silt loams, 0 to 3 percent slopes.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness.	Severe: seasonal wetness.
ChC	Chippewa and Norwich stony silt loams, 3 to 15 percent slopes.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness.	Severe: seasonal wetness.
CnC	Chippewa and Norwich very stony soils, 0 to 15 percent slopes.	Severe: seasonal wetness; stony surface and subsurface layers.	Severe: seasonal wetness; slow permeability; stony surface and subsurface layers.	Severe: seasonal wetness; slow permeability; stony surface and subsurface layers.	Severe: seasonal wetness; stony surface and subsurface layers.	Severe: seasonal wetness.
CoB	Conesus channery silt loam, 2 to 10 percent slopes.	Moderate: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Slight	Moderate: seasonal wetness; slopes.

limitation of soils for specified nonfarm uses

Community developments—Continued	Recreation use				
Pipeline installation	Campsites		Athletic fields	Picnic and play areas	Ski slopes
	Trailers	Tents			
Moderate: stability of substratum variable; flooding or wetness may hinder installation.	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.	Severe: nearly level.
Slight	Moderate or severe: seasonal wetness; slopes; slow permeability.	Moderate or severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slopes; slow permeability; channery silt loam surface layer.	Moderate: seasonal wetness.	Slight.
Severe: bedrock at depth of 1½ feet.	Severe: bedrock at depth of 1½ feet.	Severe: bedrock at depth of 1½ feet.	Severe: bedrock at depth of 1½ feet; flaggy silt loam surface texture.	Severe: bedrock at depth of 1½ feet.	Severe: bedrock at depth of 1½ feet.
Slight: flooding or wetness may hinder installation.	Slight or moderate: occasional flooding.	Slight or moderate: occasional flooding.	Slight or moderate: occasional flooding.	Slight or moderate: occasional flooding.	Severe: slopes are nearly level.
Slight: flooding or wetness may hinder installation.	Slight or moderate: occasional flooding.	Slight or moderate: occasional flooding.	Severe: slopes; gravelly loam surface texture.	Slight or moderate: occasional flooding.	Slight to severe: some slopes are nearly level.
Slight: flooding or wetness may hinder installation.	Slight or moderate: occasional flooding.	Slight or moderate: occasional flooding.	Slight or moderate: occasional flooding.	Slight or moderate: occasional flooding.	Severe: slopes are nearly level.
Slight: flooding or wetness may hinder installation.	Moderate: frequent flooding; seasonal wetness.	Moderate: frequent flooding; seasonal wetness.	Moderate: frequent flooding; seasonal wetness.	Slight or moderate: frequent flooding.	Severe: some slopes are nearly level.
Slight	Moderate or severe: seasonal wetness; slow permeablility.	Moderate or severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability; channery silt loam surface layer.	Moderate: seasonal wetness.	Slight.
Slight	Severe: seasonal wetness; slopes; slow permeability.	Moderate or severe: seasonal wetness; slopes; slow permeability.	Severe: seasonal wetness; slopes; slow permeability.	Moderate: seasonal wetness; slopes.	Slight.
Slight	Severe: slopes	Severe: slopes	Severe: slopes; stony silt loam surface layer.	Severe: slopes	Slight.
Severe: slopes	Severe: slopes	Severe: slopes	Severe: slopes; stony silt loam surface layer.	Severe: slopes	Slight.
Slight: flooding or wetness may hinder installation.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permability.	Severe: seasonal wetness; slow permeability; stony silt loam surface layer.	Severe: seasonal wetness.	Severe: some slopes are nearly level.
Slight: flooding or wetness may hinder installation.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slopes; slow permeability, stony silt loam surface layer.	Severe: seasonal wetness.	Slight.
Moderate: stony surface and subsurface; flooding or wetness may hinder installation.	Severe: seasonal wetness; slow permeability; stony surface and subsurface layers.	Severe: seasonal wetness; slow permeability; stony surface and subsurface layers.	Severe: seasonal wetness; slopes; slow permeability; stony surface and subsurface layers.	Severe: seasonal wetness; stony surface and subsurface layers.	Severe: stony surface and subsurface layers.
Slight	Moderate: seasonal wetness; slopes; slow permeability.	Slight or moderate: seasonal wetness; slow permeability.	Severe: slow permeability; channery silt loam surface layer.	Slight	Slight.

TABLE 7.—*Estimated degree and kind of limitation*

Map symbol	Soil	Community developments: Homesites	Septic tank effluent	Sanitary landfill	Landscaping	Streets and parking lots
CoC	Conesus channery silt loam, 10 to 20 percent slopes.	Moderate: seasonal wetness; slopes.	Severe: seasonal wetness; slopes; slow permeability.	Severe: seasonal wetness; slopes; slow permeability.	Moderate: slopes.	Severe: slopes.
CuB	Culvers stony silt loam, 2 to 8 percent slopes.	Moderate: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: stony silt loam surface layer.	Moderate: seasonal wetness; slopes.
CuC	Culvers stony silt loam, 8 to 15 percent slopes.	Moderate: seasonal wetness; slopes.	Severe: seasonal wetness; slopes; slow permeability.	Severe: seasonal wetness; slopes; slow permeability.	Moderate: slopes; stony silt loam surface layer.	Severe: slopes.
CuD	Culvers stony silt loam, 15 to 25 percent slopes.	Moderate or severe: seasonal wetness; slopes.	Severe: seasonal wetness; slopes; slow permeability.	Severe: slopes; slow permeability.	Severe: slopes.	Severe: slopes.
DaB	Darien channery silt loam, 2 to 8 percent slopes.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: seasonal wetness.	Moderate: seasonal wetness; slopes.
DaC	Darien channery silt loam, 8 to 15 percent slopes.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: seasonal wetness; slopes.	Severe: slopes.
DcC3	Darien channery silty clay loam, 8 to 15 percent slopes, eroded.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: seasonal wetness; slopes.	Severe: slopes.
DdB	Darien silt loam, gently undulating, 2 to 8 percent slopes.	Moderate: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Slight.	Moderate: slopes.
DdC	Darien silt loam, undulating, 8 to 15 percent slopes.	Moderate: seasonal wetness; slopes.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: slopes.	Severe: slopes.
DdD	Darien silt loam, undulating, 15 to 25 percent slopes.	Severe: slopes.	Severe: seasonal wetness; slopes; slow permeability.	Severe: slopes.	Severe: slopes.	Severe: slopes.
DeB	Darien silt loam, 2 to 8 percent slopes.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: seasonal wetness.	Moderate: seasonal wetness; slopes.
DeC	Darien silt loam, 8 to 15 percent slopes.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: seasonal wetness; slopes.	Severe: slopes.
DsB3	Darien silty clay loam, 2 to 8 percent slopes, eroded.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: seasonal wetness.	Moderate: seasonal wetness; slopes.
DuC3	Darien silty clay loam, undulating, 8 to 15 percent slopes, eroded.	Moderate: seasonal wetness; slopes.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: slopes.	Severe: slopes.
FaB	Farmington very rocky silt loam, 0 to 10 percent slopes.	Severe: bedrock at a depth of ½ to 2 feet with frequent outcrops.	Severe: bedrock at a depth of ½ to 2 feet with frequent outcrops.	Severe: bedrock at a depth of ½ to 2 feet with frequent outcrops.	Severe: bedrock at a depth of ½ to 2 feet with frequent outcrops.	Severe: bedrock at a depth of ½ to 2 feet with frequent outcrops.

of soils for specified nonfarm uses—Continued

Community developments—Continued	Recreation use				
Pipeline installation	Campsites		Athletic fields	Picnic and play areas	Ski slopes
	Trailers	Tents			
Slight	Severe: slopes; slow permeability.	Moderate or severe: slopes; slow permeability.	Severe: slopes; slow permeability; channery silt loam surface layer.	Moderate or severe: slopes.	Slight.
Slight	Moderate: seasonal wetness; slopes; slow permeability.	Slight or moderate: seasonal wetness; slow permeability.	Severe: slow permeability; stony silt loam surface layer.	Slight	Slight.
Slight	Severe: slopes; slow permeability.	Moderate: seasonal wetness; slopes; slow permeability.	Severe: slopes; slow permeability; stony silt loam surface layer.	Moderate: slopes	Slight.
Slight	Severe: slopes	Severe: slopes	Severe: slopes; slow permeability; stony silt loam surface layer.	Severe: slopes	Slight.
Slight	Moderate or severe: seasonal wetness; slopes; slow permeability.	Moderate or severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability; channery silt loam surface layer.	Moderate: seasonal wetness.	Slight.
Slight	Severe: seasonal wetness; slopes; slow permeability.	Moderate or severe: seasonal wetness; slopes; slow permeability.	Severe: seasonal wetness; slopes; slow permeability; channery silt loam surface layer.	Moderate: seasonal wetness; slopes.	Slight.
Slight	Severe: seasonal wetness; slopes; channery silty clay loam surface layer.	Moderate or severe: seasonal wetness; slopes; slow permeability; channery silty clay loam surface layer.	Severe: seasonal wetness; slopes; slow permeability; channery silty clay loam surface layer.	Moderate: seasonal wetness; slopes; channery silty clay loam surface layer.	Slight.
Slight	Moderate: seasonal wetness; slopes; slow permeability.	Moderate: seasonal wetness; slow permeability.	Moderate: seasonal wetness; slopes.	Slight	Severe: slopes.
Slight	Severe: slopes	Moderate: seasonal wetness; slopes; slow permeability.	Severe: slopes	Moderate: slopes	Severe: slopes.
Slight	Severe: slopes	Severe: slopes	Severe: slopes	Severe: slopes	Severe: slopes.
Slight	Moderate or severe: seasonal wetness; slopes; slow permeability.	Moderate or severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: seasonal wetness.	Slight.
Slight	Severe: seasonal wetness; slopes; slow permeability.	Moderate or severe: seasonal wetness; slopes; slow permeability.	Severe: seasonal wetness; slopes; slow permeability.	Moderate: seasonal wetness; slopes.	Slight.
Slight	Moderate or severe: seasonal wetness; slopes; slow permeability.	Moderate or severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: seasonal wetness.	Slight.
Slight	Severe: seasonal wetness; slopes.	Moderate or severe: seasonal wetness; slopes.	Severe: seasonal wetness; slopes; slow permeability.	Moderate: slopes	Severe: slopes.
Severe: bedrock at a depth of ½ to 2 feet with frequent outcrops.	Severe: bedrock at a depth of ½ to 2 feet with frequent outcrops.	Severe: bedrock at a depth of ½ to 2 feet with frequent outcrops.	Severe: bedrock at a depth of ½ to 2 feet with frequent outcrops.	Severe: bedrock at a depth of ½ to 2 feet with frequent outcrops.	Severe: bedrock at a depth of ½ to 2 feet with frequent outcrops.

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TABLE 7.—*Estimated degree and kind of limitation*

Map symbol	Soil	Community developments				
		Homesites	Septic tank effluent	Sanitary landfill	Landscaping	Streets and parking lots
FaF	Farmington very rocky silt loam, 10 to 70 percent slopes.	Severe: slopes; bedrock at a depth of ½ to 2 feet with frequent outcrops.	Severe: slopes; bedrock at a depth of ½ to 2 feet with frequent outcrops.	Severe: slopes; bedrock at a depth of ½ to 2 feet with frequent outcrops.	Severe: slopes; bedrock at a depth of ½ to 2 feet with frequent outcrops.	Severe: slopes; bedrock at a depth of ½ to 2 feet with frequent outcrops.
Fh	Fredon and Halsey gravelly loams.	Severe: seasonal wetness.	Severe: seasonal wetness; risk of polluting nearby water supply.	Severe: seasonal wetness.	Severe: seasonal wetness.	Severe: seasonal wetness.
Ha	Holly and Papakating silt loams.	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.
HfB	Honeoye-Farmington complex, 2 to 10 percent slopes.	Moderate or severe: bedrock at a depth of ½ to 3½ feet with occasional outcrops.	Severe: bedrock at a depth of ½ to 3½ feet with occasional outcrops.	Severe: bedrock at a depth of ½ to 3½ feet with occasional outcrops.	Moderate or severe: bedrock at a depth of ½ to 3½ feet with occasional outcrops.	Moderate or severe: slopes; bedrock at a depth of ½ to 3½ feet with occasional outcrops.
HfC	Honeoye-Farmington complex, 10 to 20 percent slopes.	Moderate or severe: slopes; bedrock at a depth of ½ to 3½ feet with occasional outcrops.	Severe: slopes; bedrock at a depth of ½ to 3 feet with occasional outcrops.	Severe: slopes; bedrock at a depth of ½ to 3½ feet with occasional outcrops.	Moderate or severe: slopes; bedrock at a depth of ½ to 3½ feet with occasional outcrops.	Severe: slopes; bedrock at a depth of ½ to 3½ feet with occasional outcrops.
HgA	Howard gravelly silt loam, 0 to 5 percent slopes.	Slight	Slight: risk of polluting nearby water supply.	Slight	Slight	Slight
HgC	Howard gravelly silt loam, 5 to 15 percent slopes.	Moderate: slopes	Moderate: slopes; risk of polluting nearby water supply.	Moderate: slopes	Slight or moderate: slopes.	Moderate or severe: slopes.
IaB	Ilion and Appleton silt loams, 3 to 8 percent slopes.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate or severe: seasonal wetness.	Severe: seasonal wetness.
IlA	Ilion and Lyons silt loams, 0 to 3 percent slopes.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness.	Severe: seasonal wetness.
IlC	Ilion and Lyons silt loams, 3 to 15 percent slopes.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness.	Severe: seasonal wetness; slopes.
LaA	Lakemont and Madalin soils, deep, 0 to 2 percent slopes.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness.	Severe: seasonal wetness.
LdB	Lakemont and Madalin silty clay loams, 2 to 6 percent slopes.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness.	Severe: seasonal wetness.
LhB	Lansing channery silt loam, 2 to 10 percent slopes.	Slight	Moderate: moderately slow and slow permeability.	Severe: moderately slow and slow permeability.	Slight: slopes	Moderate: slopes
LhC	Lansing channery silt loam, 10 to 20 percent slopes.	Moderate: slopes	Severe: slopes; moderately slow and slow permeability.	Severe: slopes; moderately slow and slow permeability.	Moderate or severe: slopes.	Severe: slopes

of soils for specified nonfarm uses—Continued

Community developments—Continued	Recreation use				
Pipeline installation	Campsites: Trailers	Campsites: Tents	Athletic fields	Picnic and play areas	Ski slopes
Severe: slopes; bedrock at a depth of ½ to 2 feet with frequent outcrops.	Severe: slopes; bedrock at a depth of ½ to 2 feet with frequent outcrops.	Severe: slopes; bedrock at a depth of ½ to 2 feet with frequent outcrops.	Severe: slopes; bedrock at a depth of ½ to 2 feet with frequent outcrops.	Severe: slopes; bedrock at a depth of ½ to 2 feet with frequent outcrops.	Severe: slopes; bedrock at a depth of ½ to 2 feet with frequent outcrops.
Slight: flooding or wetness may hinder installation.	Severe: seasonal wetness.	Severe: seasonal wetness.	Severe: seasonal wetness; gravelly loam surface layer.	Severe: seasonal wetness.	Severe: some slopes are nearly level.
Slight: Flooding or wetness may hinder installation.	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.	Severe: some slopes are nearly level.
Severe: bedrock at a depth of ½ to 3½ feet with occasional outcrops.	Moderate: slopes; bedrock at a depth of ½ to 3½ feet with occasional outcrops.	Slight	Severe: slopes; gravelly or channery surface layers.	Slight or moderate: bedrock at a depth of ½ to 3½ feet.	Moderate or severe: bedrock at a depth of ½ to 3½ feet.
Severe: bedrock at a depth of ½ to 3½ feet with occasional outcrop.	Severe: slopes	Moderate: slopes	Severe: slopes; bedrock at a depth of ½ to 3½ feet with occasional outcrops; gravelly or channery surface layers.	Moderate or severe: slopes; bedrock at a depth of ½ to 3½ feet with occasional outcrops.	Moderate or severe: bedrock at a depth of ½ to 3½ feet with occasional outcrops.
Slight	Slight	Slight	Severe: gravelly silt loam surface layer.	Slight	Severe: some slopes are nearly level.
Slight	Moderate or severe: slopes.	Slight	Severe: slopes; gravelly silt loam surface layer.	Moderate: slopes	Severe: generally short slopes.
Slight: flooding or wetness may hinder installation.	Severe: seasonal wetness.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Moderate or severe: seasonal wetness.	Slight.
Slight: flooding or wetness may hinder installation.	Severe: seasonal wetness.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness.	Severe: some slopes are nearly level.
Slight: flooding or wetness may hinder installation.	Severe: seasonal wetness.	Severe: seasonal wetness.	Severe: seasonal wetness; slopes; slow permeability.	Severe: seasonal wetness.	Slight.
Moderate: seasonally poor stability in cuts; flooding or wetness may hinder installation.	Severe: seasonal wetness.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness.	Severe: slopes are nearly level.
Moderate: seasonally poor stability in cuts; flooding or wetness may hinder installation.	Severe: seasonal wetness.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness.	Severe: slopes.
Slight	Moderate: slopes	Slight	Severe: slopes; channery silt loam surface layer.	Slight	Slight.
Slight	Severe: slopes	Moderate or severe: slopes.	Severe: slopes; channery silt loam surface layer.	Moderate or severe: slopes.	Slight.

TABLE 7.—*Estimated degree and kind of limitation*

Map symbol	Soil	Community developments: Homesites	Septic tank effluent	Sanitary landfill	Landscaping	Streets and parking lots
LhC3	Lansing channery silt loam, 10 to 20 percent slopes, eroded.	Moderate: slopes.	Severe: slopes; moderately slow and slow permeability.	Severe: slopes; moderately slow and slow permeability.	Moderate or severe: slopes.	Severe: slopes.
LmA	Lordstown channery silt loam, 0 to 5 percent slopes.	Severe: bedrock at a depth of 2 to 3 feet.	Severe: bedrock at a depth of 2 to 3 feet.	Severe: bedrock at a depth of 2 to 3 feet.	Moderate: bedrock at a depth of 2 to 3 feet.	Severe: bedrock at a depth of 2 to 3 feet.
LmC	Lordstown channery silt loam, 5 to 15 percent slopes.	Severe: bedrock at a depth of 2 to 3 feet with occasional outcrops.	Severe: bedrock at a depth of 2 to 3 feet with occasional outcrops.	Severe: bedrock at a depth of 2 to 3 feet with occasional outcrops.	Moderate: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops.	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops.
LmD	Lordstown channery silt loam, 15 to 25 percent slopes.	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops.	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops.	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops.	Severe: slopes.	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops.
LmE	Lordstown channery silt loam, 25 to 35 percent slopes.	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops.	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops.	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops.	Severe: slopes.	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops.
LnB	Lordstown silt loam, 0 to 8 percent slopes.	Moderate: slopes.	Moderate: shale bedrock at a depth of 2 to 3 feet.	Severe: bedrock at a depth of 2 to 3 feet.	Slight.	Moderate: slopes; bedrock at a depth of 2 to 3 feet.
LoE	Lordstown and Oquaga very stony soils, 0 to 35 percent slopes.	Moderate: slopes; bedrock at a depth of 2 to 3 feet; very stony surface and subsurface layers.	Severe: slopes; bedrock at a depth of 2 to 3 feet; very stony surface and subsurface layers.	Severe: slopes; bedrock at a depth of 2 to 3 feet; very stony surface and subsurface layers.	Severe: slopes; very stony surface and subsurface layers.	Severe: slopes; bedrock at a depth of 2 to 3 feet; very stony surface and subsurface layers.
LrF	Lordstown, Oquaga and Nassau soils, 35 to 70 percent slopes.	Severe: slopes; bedrock at a depth of 2 to 3 feet; very stony surface and subsurface layers.	Severe: slopes; bedrock at a depth of 2 to 3 feet; very stony surface and subsurface layers.	Severe: slopes; bedrock at a depth of 2 to 3 feet; very stony surface and subsurface layers.	Severe: slopes; very stony surface and subsurface layers.	Severe: slopes; bedrock at a depth of 2 to 3 feet; very stony surface and subsurface layers.
LsB	Lyons silt loam, shallow, 0 to 8 percent slopes.	Severe: seasonal wetness; bedrock at a depth of 1 to 1½ feet.	Severe: seasonal wetness; bedrock at a depth of 1 to 1½ feet.	Severe: seasonal wetness; bedrock at a depth of 1 to 1½ feet.	Severe: seasonal wetness.	Severe: seasonal wetness; bedrock at a depth of 1 to 1½ feet.
LyB	Lyons and Ilion very stony soils, 0 to 8 percent slopes.	Severe: seasonal wetness; very stony surface and subsurface layers.	Severe: seasonal wetness; slow permeability; very stony surface and subsurface layers.	Severe: seasonal wetness; slow permeability; very stony surface and subsurface layers.	Severe: seasonal wetness; very stony surface and subsurface layers.	Severe: seasonal wetness; very stony surface and subsurface layers.
Ma	Madalin silt loam, over till.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness.	Severe: seasonal wetness.
McB	Mardin channery silt loam, 2 to 8 percent slopes.	Moderate: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Slight.	Moderate: seasonal wetness; slopes.

of soils for specified nonfarm uses—Continued

Community developments—Continued	Recreation use				
Pipeline installation	Campsites		Athletic fields	Picnic and play areas	Ski slopes
	Trailers	Tents			
Slight	Severe: slopes	Moderate or severe: slopes.	Severe: slopes; channery silt loam surface layer.	Moderate or severe: slopes.	Slight.
Severe: bedrock at a depth of 2 to 3 feet.	Slight	Slight	Severe: bedrock at a depth of 2 to 3 feet; channery silt loam surface layer.	Moderate: bedrock at a depth of 2 to 3 feet.	Severe: some slopes are nearly level.
Severe: bedrock at a depth of 2 to 3 feet with occasional outcrops.	Moderate or severe: slopes.	Slight or moderate: slopes.	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops.	Moderate: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops.	Moderate: bedrock at a depth of 2 to 3 feet with occasional outcrops.
Severe: bedrock at a depth of 2 to 3 feet with occasional outcrops.	Severe: slopes	Severe: slopes	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops; channery silt loam surface layer.	Severe: slopes	Moderate: bedrock at a depth of 2 to 3 feet with occasional outcrops.
Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops.	Severe: slopes	Severe: slopes	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops; channery silt loam surface layer.	Severe: slopes	Moderate: bedrock at a depth of 2 to 3 feet with occasional outcrops.
Slight or moderate: bedrock at a depth of 2 to 3 feet.	Slight or moderate: slopes.	Slight	Moderate or severe: slopes; bedrock at a depth of 2 to 3 feet.	Slight	Slight.
Severe: bedrock at a depth of 2 to 3 feet; very stony surface and subsurface layers.	Severe: slopes; very stony surface and subsurface layers.	Severe: slopes; very stony surface and subsurface layers.	Severe: slopes; bedrock at a depth of 2 to 3 feet; very stony surface and subsurface layers.	Moderate or severe: slopes; bedrock at a depth of 2 to 3 feet; very stony surface and subsurface layers.	Severe: very stony surface and subsurface layers.
Severe: slopes; bedrock at a depth of 2 to 3 feet; very stony surface and subsurface layers.	Severe: slopes	Severe: slopes	Severe: slopes; bedrock at a depth of 2 to 3 feet; very stony surface and subsurface layers.	Severe: slopes; bedrock at a depth of 2 to 3 feet; very stony surface and subsurface layers.	Slight to severe: slopes; very stony surface and subsurface layers.
Severe: bedrock at a depth of 1 to 1½ feet; flooding or wetness may hinder installation.	Severe: slow permeability.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; bedrock at a depth of 1 to 1½ feet.	Severe: seasonal wetness.	Severe: bedrock at a depth of 1 to 1½ feet.
Moderate: very stony surface and subsurface layers; flooding or wetness may hinder installation.	Severe: seasonal wetness; slow permeability; very stony surface and subsurface layers.	Severe: seasonal wetness; slow permeability; very stony surface and subsurface layers.	Severe: seasonal wetness; slow permeability; very stony surface and subsurface layers.	Severe: seasonal wetness; very stony surface and subsurface layers.	Moderate or severe: seasonal wetness; some slopes are nearly level; very stony surface and subsurface layers.
Slight: flooding or wetness may hinder installation.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness.	Severe: some slopes are nearly level.
Slight	Moderate: seasonal wetness; slopes; slow permeability.	Slight or moderate: seasonal wetness; slow permeability.	Severe: slow permeability; channery silt loam surface layer.	Slight	Slight.

TABLE 7.—*Estimated degree and kind of limitation*

Map symbol	Soil	Community developments				
		Homesites	Septic tank effluent	Sanitary landfill	Landscaping	Streets and parking lots
McC	Mardin channery silt loam, 8 to 15 percent slopes.	Moderate: seasonal wetness; slopes.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: slopes.	Severe: slopes.
McC3	Mardin channery silt loam, 8 to 15 percent slopes, eroded.	Moderate: seasonal wetness; slopes.	Severe: seasonal wetness; slopes; slow permeability.	Severe: seasonal wetness; slopes; slow permeability.	Severe: slopes.	Severe: slopes.
McD	Mardin channery silt loam, 15 to 25 percent slopes.	Moderate or severe; seasonal wetness; slopes.	Severe: seasonal wetness; slopes; slow permeability.	Severe: seasonal wetness; slopes; slow permeability.	Severe: slopes.	Severe: slopes.
McE	Mardin channery silt loam, 25 to 35 percent slopes.	Severe: slopes.	Severe: slopes; slow permeability.	Severe: slopes; slow permeability.	Severe: slopes.	Severe: slopes.
MdF	Mardin and Cattaraugus soils, 35 to 70 percent slopes.	Severe: slopes.	Severe: slopes; slow permeability; very stony surface and subsurface layers.	Severe: slopes; slow permeability; very stony surface and subsurface layers.	Severe: slopes; very stony surface and subsurface layers.	Severe: slopes; very stony surface and subsurface layers.
MeE	Mardin and Culvers very stony soils, 0 to 35 percent slopes.	Severe: seasonal wetness; slopes; very stony surface and subsurface layers.	Severe: seasonal wetness; slopes; slow permeability; very stony surface and subsurface layers.	Severe: seasonal wetness; slopes; slow permeability; very stony surface and subsurface layers.	Severe: slopes; very stony surface and subsurface layers.	Moderate or severe: seasonal wetness; slopes; very stony surface and subsurface layers.
MhC	Mohawk and Honeoye silt loams, 10 to 20 percent slopes.	Moderate: seasonal wetness; slopes.	Moderate or severe: seasonal wetness; slopes; slow permeability.	Severe: seasonal wetness; slopes; slow permeability.	Moderate: slopes.	Severe: slopes.
MhC3	Mohawk and Honeoye silt loams, 10 to 20 percent slopes, eroded.	Moderate: seasonal wetness; slopes.	Moderate or severe: seasonal wetness; slopes; slow permeability.	Severe: seasonal wetness; slopes; slow permeability.	Moderate or severe: slopes.	Severe: slopes.
MhD	Mohawk and Honeoye silt loams, 20 to 30 percent slopes.	Moderate or severe: slopes.	Severe: slopes; slow permeability.	Severe: slopes.	Severe: slopes.	Severe: slopes.
MhF	Mohawk and Honeoye soils, 30 to 50 percent slopes.	Severe: slopes.	Severe: slopes.	Severe: slopes.	Severe: slopes.	Severe: slopes.
MkC	Mohawk and Lansing very stony silt loams, 3 to 20 percent slopes.	Moderate or severe: slopes; very stony surface and subsurface layers.	Severe: slopes; slow permeability; very stony surface and subsurface layers.	Severe: slopes; very stony surface and subsurface layers.	Severe: very stony surface and subsurface layers.	Moderate or severe: slopes; very stony surface and subsurface layers.
MkD	Mohawk and Lansing very stony silt loams, 20 to 30 percent slopes.	Severe: slopes; very stony surface and subsurface layers.	Severe: slopes; slow permeability; very stony surface and subsurface layers.	Severe: slopes; slow permeability; very stony surface and subsurface layers.	Severe: slopes; very stony surface and subsurface layers.	Severe: slopes.
MlB	Mohawk and Lima silt loams, 2 to 10 percent slopes.	Moderate: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Slight.	Moderate: seasonal wetness; slopes.

of soils for specified nonfarm uses—Continued

Community developments—Continued	Recreation use				
Pipeline installation	Campsites: Trailers	Campsites: Tents	Athletic fields	Picnic and play areas	Ski slopes
Slight	Severe: slopes	Moderate: seasonal wetness; slopes; slow permeability.	Severe: slopes; slow permeability; channery silt loam surface layer.	Moderate: slopes	Slight.
Slight	Severe: slopes	Moderate: seasonal wetness; slopes; slow permeability.	Severe: slopes; slow permeability; channery silt loam surface layer.	Moderate: slopes	Slight.
Slight	Severe: slopes	Severe: slopes	Severe: slopes; slow permeability; channery silt loam surface layer.	Severe: slopes	Slight.
Moderate: slopes	Severe: slopes	Severe: slopes	Severe: slopes; slow permeability; channery silt loam surface layer.	Severe: slopes	Slight.
Severe: slopes; very stony surface and subsurface layers.	Severe: slopes; very stony surface and subsurface layers.	Severe: slopes; very stony surface and subsurface layers.	Severe: slopes; very stony surface and subsurface layers.	Severe: slopes	Moderate or severe: slopes; very stony surface and subsurface layers.
Moderate or severe: very stony surface and subsurface layers.	Severe: slopes; very stony surface and subsurface layers.	Severe: slopes; very stony surface and subsurface layers.	Severe: slopes; very stony surface and subsurface layers.	Moderate or severe: slopes; very stony surface and subsurface layers.	Moderate or severe: very stony surface and subsurface layers.
Slight	Severe: slopes	Moderate or severe: slopes.	Severe: slopes	Moderate or severe: slopes.	Slight.
Slight	Severe: slopes	Moderate or severe: slopes.	Severe: slopes	Moderate or severe: slopes.	Slight.
Slight	Severe: slopes	Severe: slopes	Severe: slopes	Severe: slopes	Slight.
Moderate: slopes	Severe: slopes	Severe: slopes	Severe: slopes	Severe: slopes	Slight.
Moderate: very stony surface and subsurface layers.	Severe: slopes; very stony surface and subsurface layers.	Severe: slopes; very stony surface and subsurface layers.	Severe: slopes; very stony surface and subsurface layers.	Moderate or severe: slopes; very stony surface and subsurface layers.	Moderate: very stony surface and subsurface layers.
Moderate or severe: slopes; very stony surface and subsurface layers.	Severe: slopes; very stony surface and subsurface layers.	Moderate: slopes; very stony surface and subsurface layers.	Severe: slopes; very stony surface and subsurface layers.	Severe: slopes; very stony surface and subsurface layers.	Moderate: very stony surface and subsurface layers.
Slight	Moderate: seasonal wetness; slopes; slow permeability.	Slight or moderate: seasonal wetness; slopes; slow permeability.	Moderate or severe: slopes; slow permeability.	Slight	Slight.

TABLE 7.—*Estimated degree and kind of limitation*

Map symbol	Soil	Community developments				
		Homesites	Septic tank effluent	Sanitary landfill	Landscaping	Streets and parking lots
MIB3	Mohawk and Lima silt loams, 2 to 10 percent slopes, eroded.	Moderate: seasonal wetness.	Severe: seasonal wetness; slow permeability	Severe: seasonal wetness; slow permeability.	Slight	Moderate: seasonal wetness; slopes.
MoB	Morris stony silt loam, 2 to 8 percent slopes.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: seasonal wetness; stony surface layer.	Moderate: seasonal wetness; slopes.
MoC	Morris stony silt loam, 8 to 15 percent slopes.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: seasonal wetness; slopes; stony surface layer.	Severe: slopes
Ms	Muck, slightly acid.	Severe: frequent flooding; seasonal wetness; unstable organic material.	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.	Severe: seasonal wetness; unstable organic material.
Mu	Muck and Peat, strongly acid.	Severe: frequent flooding; seasonal wetness; unstable organic material.	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.	Severe: seasonal wetness; unstable organic material.
NaC	Nassau shaly silt loam, 2 to 15 percent slopes.	Moderate: bedrock at a depth of 1 to 1½ feet.	Severe: Shale bedrock at a depth of 1 to 1½ feet.	Severe: bedrock at a depth of 1 to 1½ feet.	Moderate: bedrock at a depth of 1 to 1½ feet.	Moderate or severe: slopes; bedrock at a depth of 1 to 1½ feet.
NaE	Nassau shaly silt loam, 15 to 35 percent slopes.	Severe: slopes	Severe: slopes; bedrock at a depth of 1 to 1½ feet.	Severe slopes; bedrock at a depth of 1 to 1½ feet.	Severe: slopes; bedrock at a depth of 1 to 1½ feet.	Severe: slopes
NdB	Nunda channery silt loam, 3 to 10 percent slopes.	Moderate: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Slight	Moderate: seasonal wetness; slopes.
NdC	Nunda channery silt loam, 10 to 20 percent slopes.	Moderate: seasonal wetness; slopes.	Severe: seasonal wetness; slopes; slow permeability.	Severe: seasonal wetness; slopes; slow permeability.	Moderate or severe: slopes.	Severe: slopes
NdC3	Nunda channery silt loam, 10 to 20 percent slopes, eroded.	Moderate: seasonal wetness; slopes.	Severe: seasonal wetness; slopes; slow permeability.	Severe: seasonal wetness; slopes; slow permeability.	Severe: slopes	Severe: slopes
NdD	Nunda channery silt loam, 20 to 30 percent slopes.	Severe: slopes	Severe: slopes; slow permeability.	Severe: slopes	Severe: slopes	Severe: slopes
NdD3	Nunda channery silt loam, 20 to 30 percent slopes, eroded.	Severe: slopes	Severe: slopes; slow permeability.	Severe: slopes	Severe: slopes	Severe: slopes
NIB	Nunda and Langford channery silt loams, 3 to 8 percent slopes.	Moderate: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Slight	Moderate: seasonal wetness; slopes.
NIC	Nunda and Langford channery silt loams, 8 to 15 percent slopes.	Moderate: seasonal wetness; slopes.	Severe: seasonal wetness; slopes; slow permeability.	Severe: seasonal wetness; slopes; slow permeability.	Moderate: slopes.	Severe: slopes

of soils for specified nonfarm uses—Continued

Community developments—Continued	Recreation use				
Pipeline installation	Campsites		Athletic fields	Picnic and play areas	Ski slopes
	Trailers	Tents			
Slight	Moderate: seasonal wetness; slopes; slow permeability.	Slight or moderate: seasonal wetness; slopes; slow permeability.	Severe	Slight	Slight.
Slight	Moderate or severe: seasonal wetness; slow permeability.	Moderate or severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability; stony surface layer.	Moderate: seasonal wetness.	Slight.
Slight	Severe: slopes	Moderate: seasonal wetness; slopes; slow permeability.	Severe: seasonal wetness; slopes; slow permeability; stony surface layer.	Moderate: seasonal wetness; slopes.	Slight.
Severe: seasonal wetness; unstable organic material; flooding or wetness may hinder installation.	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.	Severe: seasonal wetness; some slopes are nearly level; unstable organic material.
Severe: seasonal wetness; unstable organic material; flooding or wetness may hinder installation.	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.	Severe: seasonal wetness; some slopes are nearly level; unstable organic material.
Moderate: bedrock at a depth of 1 to 1½ feet.	Moderate or severe: slopes; bedrock at a depth of 1 to 1½ feet.	Moderate: slopes; bedrock at a depth of 1 to 1½ feet.	Severe: slopes; bedrock at a depth of 1 to 1½ feet; shaly silt loam surface layer.	Slight or moderate: slopes; bedrock at a depth of 1 to 1½ feet.	Moderate: bedrock at a depth of 1 to 1½ feet.
Moderate: bedrock at a depth of 1 to 1½ feet.	Severe: slopes	Severe: slopes	Severe: slopes; bedrock at a depth of 1 to 1½ feet; shaly silt loam surface layer.	Severe: slopes	Moderate: bedrock at a depth of 1 to 1½ feet.
Slight	Moderate or severe: seasonal wetness; slopes; slow permeability.	Slight or moderate: seasonal wetness; slopes; slow permeability.	Severe: slopes; slow permeability; channery silt loam surface layer.	Slight	Slight.
Slight	Severe: slopes	Moderate or severe: seasonal wetness; slopes; slow permeability.	Severe: slopes; slow permeability; channery silt loam surface layer.	Moderate or severe: slopes.	Severe: short slopes.
Slight	Severe: slopes	Moderate or severe: seasonal wetness; slopes; slow permeability.	Severe: seasonal wetness; slow permeability; channery silt loam surface layer.	Moderate or severe: slopes.	Severe: short slopes.
Slight	Severe: slopes	Severe: slopes	Severe: slopes; slow permeability; channery silt loam surface layer.	Severe: slopes	Severe: short slopes.
Slight	Severe: slopes	Severe: slopes	Severe: slopes; slow permeability; channery silt loam surface layer.	Severe: slopes	Slight.
Slight	Moderate: seasonal wetness; slopes; slow permeability.	Moderate: seasonal wetness; slow permeability.	Severe: slow permeability; channery silt loam surface layer.	Slight	Slight.
Slight	Severe: slopes	Moderate: seasonal wetness; slopes; slow permeability.	Severe: slopes; slow permeability; channery silt loam surface layer.	Moderate: slopes	Slight.

TABLE 7.—*Estimated degree and kind of limitation*

Map symbol	Soil	Community developments				
		Homesites	Septic tank effluent	Sanitary landfill	Landscaping	Streets and parking lots
NIC3	Nunda and Langford channery silt loams, 8 to 15 percent slopes, eroded.	Moderate: seasonal wetness; slopes.	Moderate or severe: seasonal wetness; slopes; slow permeability.	Severe: seasonal wetness; slopes; slow permeability.	Severe: slopes	Severe: slopes
NID	Nunda and Langford channery silt loams, 15 to 25 percent slopes.	Moderate or severe: seasonal wetness; slopes.	Severe: slopes; slow permeability.	Severe: seasonal wetness; slopes; slow permeability.	Severe: slopes	Severe: slopes
OdA	Odessa and Rhinebeck silt loams, 0 to 2 percent slopes.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: seasonal wetness.	Severe: seasonal wetness.
OdB	Odessa and Rhinebeck silt loams, 2 to 6 percent slopes.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: seasonal wetness.	Moderate to severe: seasonal wetness.
OdC	Odessa and Rhinebeck silt loams, 6 to 12 percent slopes.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: seasonal wetness; slopes.	Severe: seasonal wetness; slopes.
OrC3	Odessa and Rhinebeck silty clay loams, 6 to 12 percent slopes, eroded.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability; poor trafficability and workability.	Severe: slopes	Severe: seasonal wetness; slopes.
OsC	Oquaga stony silt loam, 3 to 15 percent slopes.	Severe: bedrock at a depth of 2 to 3 feet with occasional outcrops.	Severe: bedrock at a depth of 2 to 3 feet with occasional outcrops.	Severe: bedrock at a depth of 2 to 3 feet with occasional outcrops.	Moderate: slopes; stony surface and subsurface layers.	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops.
OsD	Oquaga stony silt loam, 15 to 25 percent slopes.	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops.	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops.	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops.	Severe: slopes	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops.
OsE	Oquaga stony silt loam, 25 to 35 percent slopes.	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops.	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops.	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops.	Severe: slopes	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops.
PhA	Phelps gravelly silt loam, 0 to 5 percent slopes.	Moderate: seasonal wetness.	Moderate: seasonal wetness; risk of polluting nearby water supply.	Severe: seasonal wetness.	Slight	Moderate: seasonal wetness.
PlB	Phelps gravelly silt loam, clay substratum, 2 to 8 percent slopes.	Moderate: seasonal wetness.	Severe: seasonal wetness; slow permeability; risk of polluting nearby water supply.	Severe: seasonal wetness; slow permeability.	Slight	Severe: occasional wetness; slopes.
Rh	Red Hook gravelly silt loam.	Severe: seasonal wetness.	Severe: seasonal wetness.	Severe: seasonal wetness.	Moderate: seasonal wetness.	Moderate: seasonal wetness.

of soils for specified nonfarm uses—Continued

Community developments—Continued	Recreation use				
Pipeline installation	Campsites		Athletic fields	Picnic and play areas	Ski slopes
	Trailers	Tents			
Slight.	Severe: slopes.	Moderate or severe: seasonal wetness; slopes; slow permeability.	Severe: slopes; slow permeability; channery silt loam surface layer.	Moderate: slopes.	Slight.
Slight.	Severe: slopes.	Severe: slopes.	Severe: slopes; slow permeability; channery silt loam surface layer.	Severe: slopes.	Slight.
Moderate: clay unstable in cuts when wet; flooding or wetness may hinder installation.	Moderate or severe: seasonal wetness; slow permeability.	Moderate or severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: seasonal wetness.	Severe: some slopes are nearly level.
Moderate: clay unstable in cuts when wet; flooding or wetness may hinder installation.	Moderate or severe: seasonal wetness; slopes; slow permeability.	Moderate or severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: seasonal wetness.	Slight.
Moderate: clay unstable in cuts when wet.	Moderate or severe: seasonal wetness; slopes; slow permeability.	Moderate or severe: seasonal wetness; slopes; slow permeability.	Severe: seasonal wetness; slopes; slow permeability.	Moderate: seasonal wetness; slopes.	Slight.
Moderate: clay unstable in cuts when wet.	Severe: seasonal wetness; slopes; slow permeability.	Moderate or severe: seasonal wetness; slopes; slow permeability.	Severe: seasonal wetness; slopes; slow permeability.	Moderate: seasonal wetness; slopes.	Slight.
Severe: bedrock at a depth of 2 to 3 feet with occasional outcrops.	Moderate or severe: slopes.	Slight or moderate: slopes.	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops; stony surface and subsurface layers.	Moderate: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops.	Slight.
Severe: bedrock at a depth of 2 to 3 feet with occasional outcrops.	Severe: slopes.	Severe: slopes.	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops; stony surface and subsurface layers.	Severe: slopes.	Slight.
Severe: bedrock at a depth of 2 to 3 feet with occasional outcrops.	Severe: slopes.	Severe: slopes.	Severe: slopes; bedrock at a depth of 2 to 3 feet with occasional outcrops; stony surface and subsurface layers.	Severe: slopes.	Slight.
Slight.	Slight or moderate: seasonal wetness.	Slight or moderate: seasonal wetness.	Severe: gravelly silt loam surface layer.	Slight.	Severe: some slopes are nearly level.
Slight.	Slight or moderate: seasonal wetness; slow permeability.	Slight or moderate: seasonal wetness; slow permeability.	Severe: gravelly silt loam surface layer.	Slight.	Slight.
Slight.	Moderate or severe: seasonal wetness.	Moderate or severe: seasonal wetness.	Severe: seasonal wetness; gravelly silt loam surface layer.	Moderate: seasonal wetness.	Severe: some slopes are nearly level.

TABLE 7.—*Estimated degree and kind of limitation*

Map symbol	Soil	Community developments				
		Homesites	Septic tank effluent	Sanitary landfill	Landscaping	Streets and parking lots
ScA	Scio silt loam, 0 to 3 percent slopes.	Moderate: seasonal wetness.	Severe: seasonal wetness; risk of polluting nearby water supply.	Severe: seasonal wetness.	Slight	Moderate: seasonal wetness.
ShB	Schoharie and Hudson silt loams, 2 to 6 percent slopes.	Moderate: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Slight	Moderate: seasonal wetness; slopes.
ShC	Schoharie and Hudson silt loams, 6 to 12 percent slopes.	Moderate: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: slopes	Severe: seasonal wetness; slopes.
SnB3	Schoharie and Hudson silty clay loams, 2 to 6 percent slopes, eroded.	Moderate: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability; silty clay loam surface layer.	Moderate: slopes; erosion hazard; silty clay loam surface layer.	Moderate: seasonal wetness; slopes.
SnC3	Schoharie and Hudson silty clay loams, 6 to 12 percent slopes, eroded.	Moderate: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability; silty clay loam surface layer.	Severe: slopes; erosion hazard.	Severe: slopes
SnD3	Schoharie and Hudson silty clay loams, 12 to 20 percent slopes, eroded.	Severe: seasonal wetness; slopes.	Severe: slopes; slow permeability.	Severe: slopes; slow permeability; silty clay loam surface layer.	Severe: slopes; erosion hazard.	Severe: slopes
SoE	Schoharie soils, 20 to 40 percent slopes.	Severe: slopes; very unstable, subject to sloughing when wet.	Severe: slopes; slow permeability; very unstable, subject to sloughing when wet.	Severe: slopes; slow permeability; very unstable, subject to sloughing when wet.	Severe: slopes; very unstable; subject to sloughing when wet.	Moderate or severe: slopes; very unstable, subject to sloughing when wet.
TaB	Tuller and Allis silt loams, 0 to 8 percent slopes.	Severe: seasonal wetness; bedrock at a depth of 1 to 1½ feet in Tuller soil; shale at a depth of 1½ to 3½ feet in Allis soil.	Severe: seasonal wetness; bedrock at a depth of 1 to 1½ feet in Tuller soil; shale at a depth of 1½ to 3½ feet in Allis soil.	Severe: seasonal wetness; bedrock at a depth of 1 to 1½ feet in Tuller soil; shale at a depth of 1½ to 3½ feet in Allis soil.	Severe: seasonal wetness; bedrock at a depth of 1 to 1½ feet in Tuller soil; shale at a depth of 1½ to 3½ feet in Allis soil.	Severe: seasonal wetness; bedrock at a depth of 1 to 1½ feet in Tuller soil; shale at a depth of 1½ to 3½ feet in Allis soil.
TaC	Tuller and Allis silt loams, 8 to 15 percent slopes.	Severe: seasonal wetness; bedrock at a depth of 1 to 1½ feet in Tuller soil; shale at a depth of 1½ to 3½ feet in Allis soil.	Severe: seasonal wetness; bedrock at a depth of 1 to 1½ feet in Tuller soil; shale at a depth of 1½ to 3½ feet in Allis soil.	Severe: seasonal wetness; bedrock at a depth of 1 to 1½ feet in Tuller soil; shale at a depth of 1½ to 3½ feet in Allis soil.	Severe: seasonal wetness; bedrock at a depth of 1 to 1½ feet in Tuller soil; shale at a depth of 1½ to 3½ feet in Allis soil.	Severe: seasonal wetness; slopes; bedrock at a depth of 1 to 1½ feet in Tuller soil; shale at a depth of 1½ to 3½ feet in Allis soil.
TcA	Tunkhannock and Chenango gravelly loams, fans, 0 to 5 percent slopes.	Slight	Slight: risk of polluting nearby water supply.	Slight: risk of polluting nearby water supply.	Slight	Slight
TcC	Tunkhannock and Chenango gravelly loams, fans, 5 to 15 percent slopes.	Moderate: slopes	Moderate: slopes; risk of polluting nearby water supply.	Moderate: slopes; risk of polluting nearby water supply.	Slight or moderate: slopes.	Moderate or severe: slopes.

of soils for specified nonfarm uses—Continued

Community developments—Continued	Recreation use				
Pipeline installation	Campsites: Trailers	Campsites: Tents	Athletic fields	Picnic and play areas	Ski slopes
Slight or moderate: poor stability of silt and sand in cuts, especially when wet.	Slight or moderate: seasonal wetness.	Slight or moderate: seasonal wetness.	Slight or moderate: seasonal wetness.	Slight	Severe: some slopes are nearly level.
Moderate: poor stability in cuts when moist.	Moderate: seasonal wetness; slopes; slow permeability.	Slight or moderate: seasonal wetness; slow permeability.	Moderate: seasonal wetness; slopes; slow permeability.	Slight	Slight.
Moderate: poor stability in cuts when wet.	Moderate or severe: seasonal wetness; slopes; slow permeability.	Slight or moderate: seasonal wetness; slopes; slow permeability.	Severe: seasonal wetness: slopes; slow permeability.	Moderate: slopes	Slight.
Moderate: poor stability in cuts when wet.	Moderate: seasonal wetness; slopes; slow permeability; silty clay loam surface layer.	Moderate: seasonal wetness; slow permeability; silty clay loam surface layer.	Moderate: seasonal wetness; slopes; slow permeability; silty clay loam surface layer.	Moderate: silty clay loam surface layer.	Slight.
Moderate: poor stability in cuts when wet.	Severe: slopes	Moderate or severe: seasonal wetness; slopes; slow permeability; silty clay loam surface layer.	Severe: slopes	Moderate: slopes; silty clay loam surface layer.	Slight.
Moderate: poor stability in cuts when wet.	Severe: slopes	Severe: slopes	Severe: slopes	Severe: slopes; silty clay loam surface layer.	Slight.
Severe: slopes; very unstable, subject to sloughing when wet.	Severe: slopes; very unstable, subject to sloughing when wet.	Severe: slopes; very unstable, subject to sloughing when wet.	Severe: slopes; very unstable, subject to sloughing when wet.	Severe: slopes; very unstable, subject to sloughing when wet.	Slight to severe: some slopes are nearly level; very unstable, subject to sloughing when wet.
Severe: bedrock at a depth of 1 to 1½ feet in Tuller soil; shale at a depth of 1½ to 3 ½ feet in Allis soil.	Severe: seasonal wetness; bedrock at a depth of 1 to 1½ feet in Tuller soil; shale at a depth of 1½ to 3½ feet in Allis soil.	Severe: seasonal wetness; bedrock at a depth of 1 to 1½ feet in Tuller soil; shale at a depth of 1½ to 3½ feet in Allis soil.	Severe: seasonal wetness; bedrock at a depth of 1 to 1½ feet in Tuller soil; shale at a depth of 1½ to 3½ feet in Allis soil.	Severe: bedrock at a depth of 1 to 1½ feet in Tuller soil; shale at a depth of 1½ to 3½ feet in Allis soil.	Severe: some slopes are nearly level; bedrock at a depth of 1 to 1½ feet in Tuller soil; shale at a depth of 1½ to 3½ feet in Allis soil.
Severe: bedrock at a depth of 1 to 1½ feet in Tuller soil; shale at a depth of 1½ to 3½ feet in Allis soil.	Severe: seasonal wetness; slopes; bedrock at a depth of 1 to 1½ feet in Tuller soil; shale at a depth of 1½ to 3½ feet in Allis soil.	Severe: seasonal wetness; bedrock at a depth of 1 to 1½ feet in Tuller soil; shale at a depth of 1½ to 3½ feet in Allis soil.	Severe: seasonal wetness; slopes; bedrock at a depth of 1 to 1½ feet in Tuller soil; shale at a depth of 1½ to 3½ feet in Allis soil.	Severe: bedrock at a depth of 1 to 1½ feet in Tuller soil; shale at a depth of 1½ to 3½ feet in Allis soil.	Severe: bedrock at a depth of 1 to 1½ feet in Tuller soil; shale at a depth of 1½ to 3½ feet in Allis soil.
Slight	Slight	Slight	Severe: gravelly loam surface layer.	Slight	Severe: some slopes are nearly level.
Slight	Moderate or severe: slopes.	Slight or moderate: slopes.	Severe: slopes; gravelly loam surface layer.	Moderate: slopes	Slight.

TABLE 7.—*Estimated degree and kind of limitation*

Map symbol	Soil	Community developments: Homesites	Septic tank effluent	Sanitary landfill	Landscaping	Streets and parking lots
ThA	Tunkhannock and Chenango gravelly silt loams, 0 to 5 percent simple slopes.	Slight	Slight: risk of polluting nearby water supply.	Slight: risk of polluting nearby water supply.	Slight	Slight
ThC	Tunkhannock and Chenango gravelly silt loams, 5 to 15 percent simple slopes.	Moderate: slopes	Moderate: slopes; risk of polluting nearby water supply.	Moderate: slopes; risk of polluting nearby water supply.	Slight or moderate: slopes.	Moderate or severe: slopes.
ThCK	Tunkhannock and Chenango gravelly silt loams, 3 to 15 percent complex slopes.	Moderate: slopes	Moderate: slopes; risk of polluting nearby water supply.	Moderate: slopes; risk of polluting nearby water supply.	Moderate: slopes	Severe: slopes
ThD	Tunkhannock and Chenango gravelly silt loams, 15 to 25 percent slopes.	Moderate or severe: slopes.	Severe: slopes; risk of polluting nearby water supply.	Severe: slopes; risk of polluting nearby water supply.	Severe: slopes	Severe: slopes
TkC	Tunkhannock and Chenango soils, non-stratified, 3 to 15 percent slopes.	Slight or moderate: slopes.	Moderate: slopes; risk of polluting nearby water supply.	Moderate: slopes; risk of polluting nearby water supply.	Slight or moderate: slopes.	Moderate or severe: slopes.
TkD	Tunkhannock and Chenango soils, non-stratified, 15 to 35 percent slopes.	Moderate or severe: slopes.	Severe: slopes; risk of polluting nearby water supply.	Severe: slopes; risk of polluting nearby water supply.	Severe: slopes	Severe: slopes
TnF	Tunkhannock and Chenango soils, 25 to 60 percent slopes.	Severe: slopes	Severe: slopes; risk of polluting nearby water supply.	Severe: slopes; risk of polluting nearby water supply.	Severe: slopes	Severe: slopes
TuA	Tunkhannock cobbly sandy loam, 0 to 5 percent slopes.	Slight	Slight: risk of polluting nearby water supply.	Slight: risk of polluting nearby water supply.	Moderate: cobbly surface layer.	Slight
VcA	Volusia channery silt loam, 0 to 3 percent slopes.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: seasonal wetness.	Moderate: seasonal wetness.
VcB	Volusia channery silt loam, 3 to 8 percent slopes.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: seasonal wetness.	Moderate: seasonal wetness; slopes.
VcC	Volusia channery silt loam, 8 to 15 percent slopes.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability.	Moderate: seasonal wetness; slopes.	Severe: slopes
VmC	Volusia, Morris and Erie very stony soils, 0 to 15 percent slopes.	Severe: seasonal wetness; very stony surface layer.	Severe: seasonal wetness; slow permeability; very stony surface layer.	Severe: seasonal wetness; slow permeability; very stony surface layer.	Severe: very stony surface layer.	Moderate or severe: seasonal wetness; slopes; very stony surface layer.
Wa	Wayland silt loam	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.

of soils for specified nonfarm uses—Continued

Community developments—Continued	Recreation use				
Pipeline installation	Campsites		Athletic fields	Picnic and play areas	Ski slopes
	Trailers	Tents			
Slight	Slight	Slight	Severe: gravelly silt loam surface layer.	Moderate	Severe: some slopes are nearly level.
Slight	Moderate or severe: slopes.	Slight or moderate: slopes.	Severe: slopes; gravelly silt loam surface layer.	Moderate: slopes	Slight.
Moderate: slopes	Moderate or severe: slopes.	Slight or moderate: slopes.	Severe: slopes; gravelly silt loam surface layer.	Moderate: slopes	Severe: slopes.
Slight	Severe: slopes	Severe: slopes	Severe: slopes; gravelly silt loam surface layer.	Severe: slopes	Slight to severe.
Slight	Moderate or severe: slopes.	Slight or moderate: slopes.	Severe: slopes; gravelly or cobbly surface layer.	Moderate: slopes	Slight to severe.
Slight	Severe: slopes	Severe: slopes	Severe: slopes; gravelly or cobbly surface layer.	Severe: slopes	Slight to severe.
Severe: slopes	Severe: slopes	Severe: slopes	Severe: slopes; gravelly or cobbly surface layer.	Severe: slopes	Slight.
Slight	Moderate or severe: cobbly surface layer.	Moderate or severe: cobbly surface layer.	Severe: cobbly surface layer.	Severe: cobbly surface layer.	Severe: some slopes are nearly level.
Slight	Moderate or severe: seasonal wetness; slow permeability.	Moderate or severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability; channery silt loam surface layer.	Moderate: seasonal wetness.	Severe: some slopes are nearly level.
Slight	Moderate or severe: seasonal wetness; slopes; slow permeability.	Moderate or severe: seasonal wetness; slow permeability.	Severe: seasonal wetness; slow permeability; channery silt loam surface layer.	Moderate: seasonal wetness.	Slight.
Slight	Severe: seasonal wetness; slopes; slow permeability.	Moderate: seasonal wetness; slow permeability.	Severe: seasonal wetness; slopes; slow permeability; channery silt loam surface layer.	Moderate: seasonal wetness; slopes.	Slight.
Moderate: very stony surface layer.	Moderate or severe: seasonal wetness; slopes; slow permeability; very stony surface layer.	Moderate or severe: seasonal wetness; slopes; slow permeability; very stony surface layer.	Severe: seasonal wetness; slopes; slow permeability; very stony surface layer.	Moderate or severe: seasonal wetness; slopes; very stony surface layer.	Severe: some slopes are nearly level; very stony surface layer.
Slight: flooding or wetness may hinder installation.	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.	Severe: frequent flooding; seasonal wetness.	Severe: some slopes are nearly level.

Surface soil texture refers mainly to small rock fragments in the surface layer of soils. These fragments affect use for baseball, football, and other athletic fields. If fragments less than 10 inches in diameter make up 15 percent or more, by volume, the appropriate term, flaggy, channery, or other, is included in the soil name. Limitations of soils having these terms in their name are rated severe for athletic fields. Except for most soils on flood plains, such as Barbour and Tioga, and the finer textured lake-laid soils, such as Schoharie, Hudson, and nearby soils, few soils in the county are free of rock fragments in their surface layer. Texture of the surface layer is also important for soils used as campsites, golf courses, intensive play areas, and other uses where heavy foot or vehicular traffic occurs.

Deep, well-drained, rapidly permeable soils that are not subject to flooding, that have good stability or bearing capacity, and that are nearly level to gently sloping are rated slight for homesites. Howard gravelly silt loam, 0 to 5 percent slopes, and Tunkhannock and Chenango gravelly silt loams, 0 to 5 percent simple slopes, are examples. If these soils are rated for intensive play areas for baseball, football, and other organized games, however, the content of gravel in the surface layer causes the rating to be severe. The gently sloping Barbour and Tioga soils have many desirable features similar to those of the Howard, Tunkhannock, and Chenango soils, but they are flooded occasionally. Consequently, limitations of Barbour and Tioga soils are rated moderate or severe for homesites.

Because they are stony, shallow to bedrock, or have a dense, slowly permeable fragipan or till layer, most soils of the uplands in Schoharie County generally are less desirable for homesites than other soils. The location, esthetic value, or other features, however, may outweigh the physical limitations of the soils. Examples are the Mohawk, Honeoye, Farmington, Darien, Mardin, Lordstown, and other nearby soils on uplands. Septic tank systems for sewage disposal need to be carefully designed, and waterproofing of basements is needed because of the dense fragipan or till layer in the deeper soils. The Farmington and Lordstown soils are shallow to bedrock.

The Schoharie and Hudson soils formed in glacial lake sediments. These moderately fine textured soils are slowly permeable and unstable. When highways and railroads are built on these soils, vibrations caused by heavy traffic are transmitted to the soil mass and, in turn, to structures built on nearby soils. Buildings on these soils that are near highways and railroads often have cracked walls and ceilings, foundation failures, and other damage from the vibrations. Also, when these soils become saturated, they slip readily of their own weight where slopes are 25 percent or more. Structures therefore should not be built near the brink or at the foot of steep slopes on Schoharie and Hudson soils. Slips are common in Gilboa Township along the valley of Schoharie Creek in extensive areas of Schoharie soils.

Discussed in the following paragraphs are the nonfarm uses specified in table 7 and soil features considered in rating limitations to those uses.

Homesites: In table 7 the limitations of soils are rated on the basis of year-round or seasonal use for homesites or sites for recreation service buildings. The sites are for buildings of three stories or less that have basements averaging at least 5 feet below the normal ground level. Where these buildings are built without a basement, the depth and seasonal wetness are less restrictive. Not considered in the ratings are limitations for septic effluent disposal, providing a water supply, stabilizing or maintaining plants, or building access roads. The main soil features affecting the use of soils for homesites are seasonal wetness, slope, depth to bedrock, stoniness, and frequency of flooding.

Septic Effluent Disposal: The ratings in table 7 are for limitations of soils used as drainage fields for the disposal of septic effluent from septic tanks that are adequately designed and installed. The source or supply of water is not considered in the ratings, though possible pollution of lakes, springs, or shallow wells is indicated where the information is pertinent. Specific location of drainage fields for disposal of septic effluent requires careful investigation at the site of the proposed field. The main soil features affecting the use of soils for septic effluent disposal are permeability, seasonal wetness, depth to bedrock, slope, stoniness, and flooding.

Sanitary Land Fill: The ratings in table 7 are for limitations of soils used as disposal areas for trash and garbage by land-fill operations. In these operations a trench is dug, trash and garbage are placed in the trench, and the material is covered with dirt. No fill or borrow material from other soils is considered in the ratings. The main soil features affecting the use of soils for land fill are seasonal wetness, permeability, slope, depth to bedrock, stoniness, texture of the surface layer, and flooding.

Landscaping: The ratings of limitations of soils used for landscaping are based mainly on the suitability of soils for growing grass to provide lawns for homesites and other buildings and fairways for golf courses. These sites normally have light foot traffic and support light machines and carts. The main soil features affecting landscaping are seasonal wetness, slope, depth to bedrock, stoniness, texture of the surface layer, and flooding.

Streets and Parking Lots: The suitability of soils for streets and parking lots is about the same as that for highways. The ratings in table 7 are for soils in subdivisions where slopes generally are more restrictive than they are for highways. Specific engineering investigations and layout are required. More detailed information on the suitability of soils for highways is given in the subsection "Engineering Applications" elsewhere in this survey. The main soil features affecting the use of soils for streets and parking lots are seasonal wetness, slope, depth to bedrock, stoniness, and flooding.

Pipeline Installations: The soils in subdivisions generally are excavated for laying utility pipelines. For specific location, however, careful investigation at the site of the proposed location is required. The main soil features affecting pipeline installations are depth to bedrock, slopes, stoniness, and stability. Flooding and seasonal wetness may hinder installation during wet periods. The corrosion potential of pipes laid in the different soils is not considered in the ratings in table 7.

Campsites: In table 7 the limitations are rated for soils used as sites for tents and for trailers. Frequent use during the camping season involves both heavy foot and vehicular traffic. Campsites generally provide accommodations for a large group of people, and they have a picnic table, a fireplace, and an unsurfaced parking area. Plat-

forms for tents may be beside individual parking areas or farther away, but trailer sites and parking areas are contiguous. Sewage disposal systems, water supply, and access roads are not considered in the ratings. The main soil features affecting use are seasonal wetness, permeability, slope, depth to bedrock, stoniness, texture of the surface layer, and flooding.

Athletic Fields: Limitations of soils are rated in table 7 for intensive use for baseball, football, soccer, or other similar athletic events. When finished, the fields would be nearly level and have heavy foot traffic. Borrow material or topsoil from other soils are not considered in the ratings. The main soil features affecting soils for this use are seasonal wetness, permeability, slope, depth to bedrock, stoniness, texture of the surface layer, and flooding.

Picnic and Extensive Play Areas: The soils in extensive play areas are used for walking or runnning, mainly by children. The picnic areas have tables and fireplaces for use by groups, in contrast with small picnic sites along highways, trails, or streams. The water supply and sewage disposal systems are not considered in the ratings in table 7. The main soil features affecting the uses are seasonal wetness, slope, depth to bedrock, stoniness, texture of the surface layer, and flooding.

Ski Slopes: Limitations are rated in table 7 for soils used as ski trails. Providing service buildings, sewage disposal systems, water supply, parking areas, and access roads are not considered in the ratings. The main soil features affecting the use for ski slopes are slope, depth to bedrock, seasonal wetness, and texture of the surface layer. A north-facing or east-facing slope generally is more desirable for skiing, though this aspect is not shown in the table.

Descriptions of the Soils

This section describes the soil series and mapping units of Schoharie County. The acreage and proportionate extent of each mapping unit are given in table 8. Their location in the county is shown on the detailed soil map at the back of this survey.

The procedure is first to describe the soil series, and then the mapping units in the series. Thus, to get full information on any one mapping unit, it is necessary to read the description of that unit and also the description of the soil series to which it belongs. As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Alluvial land, for example, is a miscellaneous land type and does not belong to a soil series. It is listed nevertheless in alphabetic order along with the soil series.

Following the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Statements referring to the supply of plant nutrients are for the soils in areas that have not been fertilized.

Listed at the end of each description of a mapping unit are the capability unit and the woodland suitability group in which the mapping unit has been placed. The page numbers showing where each of these are described can be found by referring to the "Guide to Mapping Units" at the back of the survey. Many terms in the soil descriptions and in other parts of the survey are defined in the "Soil Survey Manual" (*15*) and in the Glossary. Detailed descriptions of each series are provided in the section "Descriptions of Soil Series."

Table 8.—*Approximate acreage and proportionate extent of the soils*

Soil	Area	Extent
	Acres	*Percent*
Alluvial land	5, 570	1.4
Appleton channery silt loam, 2 to 8 percent slopes	1, 410	.3
Arnot flaggy silt loam, 0 to 15 percent slopes	5, 740	1.4
Barbour and Tioga fine sandy loams	1, 090	.3
Barbour and Tioga gravelly loams, fans, 0 to 8 percent slopes	370	.1
Barbour and Tioga loams	5, 870	1.5
Basher and Middlebury silt loams	3, 280	.8
Burdett and Erie channery silt loams, 3 to 8 percent slopes	6, 080	1.5
Burdett and Erie channery silt loams, 8 to 15 percent slopes	1, 710	.4
Cattaraugus stony silt loam, 15 to 25 percent slopes	920	.2
Cattaraugus stony silt loam, 25 to 35 percent slopes	410	.1
Chippewa and Norwich stony silt loams, 0 to 3 percent slopes	2, 300	.6
Chippewa and Norwich stony silt loams, 3 to 15 percent slopes	3, 110	.8
Chippewa and Norwich very stony soils, 0 to 15 percent slopes	6, 280	1.6
Conesus channery silt loam, 2 to 10 percent slopes	200	.1
Conesus channery silt loam, 10 to 20 percent slopes	350	.1
Culvers stony silt loam, 2 to 8 percent slopes	3, 740	.9
Culvers stony silt loam, 8 to 15 percent slopes	4, 740	1.2
Culvers stony silt loam, 15 to 25 percent slopes	790	.2
Darien channery silt loam, 2 to 8 percent slopes	2, 600	.6
Darien channery silt loam, 8 to 15 percent slopes	670	0.2
Darien channery silty clay loam, 8 to 15 percent slopes, eroded	300	.1
Darien silt loam, gently undulating, 2 to 8 percent slopes	1, 010	.2
Darien silt loam, undulating, 8 to 15 percent slopes	630	.2
Darien silt loam, undulating, 15 to 25 percent slopes	510	.1
Darien silt loam, 2 to 8 percent slopes	8, 270	2.1
Darien silt loam, 8 to 15 percent slopes	420	.1
Darien silty clay loam, 2 to 8 percent slopes, eroded	850	.2
Darien silty clay loam, undulating, 8 to 15 percent slopes, eroded	1, 750	.4
Farmington very rocky silt loam, 0 to 10 percent slopes	1, 730	.4
Farmington very rocky silt loam, 10 to 70 percent slopes	1, 330	.3
Fredon and Halsey gravelly loams	240	.1
Holly and Papakating silt loams	2, 690	.7
Honeoye-Farmington complex, 2 to 10 percent slopes	10, 520	2.6
Honeoye-Farmington complex, 10 to 20 percent slopes	650	.2
Howard gravelly silt loam, 0 to 5 percent slopes	950	.2
Howard gravelly silt loam, 5 to 15 percent slopes	519	.1
Ilion and Appleton silt loams, 3 to 8 percent slopes	2, 250	.6

TABLE 8.—*Approximate acreage and proportionate extent of the soils*—Continued

Soil	Area	Extent
	Acres	*Percent*
Ilion and Lyons silt loams, 0 to 3 percent slopes	390	0.1
Ilion and Lyons silt loams, 3 to 15 percent slopes	3,740	.9
Lakemont and Madalin soils, deep, 0 to 2 percent slopes	2,060	.5
Lakemont and Madalin silty clay loams, 2 to 6 percent slopes	700	.2
Lansing channery silt loam, 2 to 10 percent slopes	2,480	.6
Lansing channery silt loam, 10 to 20 percent slopes	1,320	.3
Lansing channery silt loam, 10 to 20 percent slopes, eroded	1,710	.4
Lordstown channery silt loam, 0 to 5 percent slopes	1,260	.3
Lordstown channery silt loam, 5 to 15 percent slopes	18,220	4.5
Lordstown channery silt loam, 15 to 25 percent slopes	14,780	3.7
Lordstown channery silt loam, 25 to 35 percent slopes	7,060	1.8
Lordstown silt loam, 0 to 8 percent slopes	290	.1
Lordstown and Oquaga very stony soils, 0 to 35 percent slopes	54,400	13.6
Lordstown, Oquaga and Nassau soils, 35 to 70 percent slopes	31,930	8.0
Lyons silt loam, shallow, 0 to 8 percent slopes	160	(1)
Lyons and Ilion very stony soils, 0 to 8 percent slopes	370	.1
Madalin silt loam, over till	2,530	.6
Mardin channery silt loam, 2 to 8 percent slopes	4,280	1.1
Mardin channery silt loam, 8 to 15 percent slopes	7,770	1.9
Mardin channery silt loam, 8 to 15 percent slopes, eroded	620	.2
Mardin channery silt loam, 15 to 25 percent slopes	6,590	1.6
Mardin channery silt loam, 25 to 35 percent slopes	2,020	.5
Mardin and Cattaraugus soils, 35 to 70 percent slopes	2,240	.6
Mardin and Culvers very stony soils, 0 to 35 percent slopes	21,380	5.3
Mohawk and Honeoye silt loams, 10 to 20 percent slopes	5,170	1.3
Mohawk and Honeoye silt loams, 10 to 20 percent slopes, eroded	10,940	2.7
Mohawk and Honeoye silt loams, 20 to 30 percent slopes	6,500	1.6
Mohawk and Honeoye soils, 30 to 50 percent slopes	2,560	.6
Mohawk and Lansing very stony silt loams, 3 to 20 percent slopes	650	.2
Mohawk and Lansing very stony silt loams, 20 to 30 percent slopes	560	.1
Mohawk and Lima silt loams, 2 to 10 percent slopes	5,500	1.4
Mohawk and Lima silt loams, 2 to 10 percent slopes, eroded	870	.2
Morris stony silt loam, 2 to 8 percent slopes	2,740	.7
Morris stony silt loam, 8 to 15 percent slopes	1,020	.2
Muck, slightly acid	1,440	.4
Muck and Peat, strongly acid	600	.1
Nassau shaly silt loam, 2 to 15 percent slopes	600	.1
Nassau shaly silt loam, 15 to 35 percent slopes	1,440	.4
Nunda channery silt loam, 3 to 10 percent slopes	2,340	.6
Nunda channery silt loam, 10 to 20 percent slopes	1,590	.4
Nunda channery silt loam, 10 to 20 percent slopes, eroded	1,470	.4
Nunda channery silt loam, 20 to 30 percent slopes	480	.1
Nunda channery silt loam, 20 to 30 percent slopes, eroded	730	0.2
Nunda and Langford channery silt loams, 3 to 8 percent slopes	400	.1
Nunda and Langford channery silt loams, 8 to 15 percent slopes	1,070	.3
Nunda and Langford channery silt loams, 8 to 15 percent slopes, eroded	230	.1
Nunda and Langford channery silt loams, 15 to 25 percent slopes	640	.2
Odessa and Rhinebeck silt loams, 0 to 2 percent slopes	230	.1
Odessa and Rhinebeck silt loams, 2 to 6 percent slopes	1,380	.3
Odessa and Rhinebeck silt loams, 6 to 12 percent slopes	630	.2
Odessa and Rhinebeck silty clay loams, 6 to 12 percent slopes, eroded	310	.1
Oquaga stony silt loam, 3 to 15 percent slopes	3,640	.9
Oquaga stony silt loam, 15 to 25 percent slopes	1,930	.5
Oquaga stony silt loam, 25 to 35 percent slopes	780	.2
Phelps gravelly silt loam, 0 to 5 percent slopes	460	.1
Phelps gravelly silt loam, clay substratum, 2 to 8 percent slopes	830	.2
Red Hook gravelly silt loam	360	.1
Schoharie and Hudson silt loams, 2 to 6 percent slopes	3,110	.8
Schoharie and Hudson silt loams, 6 to 12 percent slopes	2,460	.6
Schoharie and Hudson silty clay loams, 2 to 6 percent slopes, eroded	280	.1
Schoharie and Hudson silty clay loams, 6 to 12 percent slopes, eroded	2,850	.7
Schoharie and Hudson silty clay loams, 12 to 20 percent slopes, eroded	1,840	.5
Schoharie soils, 20 to 40 percent slopes	3,780	.9
Scio silt loam, 0 to 3 percent slopes	140	(1)
Tuller and Allis silt loams, 0 to 8 percent slopes	6,860	1.7
Tuller and Allis silt loams, 8 to 15 percent slopes	200	.1
Tunkhannock and Chenango gravelly loams, fans, 0 to 5 percent slopes	440	.1
Tunkhannock and Chenango gravelly loams, fans, 5 to 15 percent slopes	560	.1
Tunkhannock and Chenango gravelly silt loams, 0 to 5 percent simple slopes	640	.2
Tunkhannock and Chenango gravelly silt loams, 5 to 15 percent simple slopes	1,450	.4
Tunkhannock and Chenango gravelly silt loams, 3 to 15 percent complex slopes	570	.1
Tunkhannock and Chenango gravelly silt loams, 15 to 25 percent slopes	1,420	.4
Tunkhannock and Chenango soils, non-stratified, 3 to 15 percent slopes	290	.1
Tunkhannock and Chenango soils, non-stratified, 15 to 35 percent slopes	170	(1)
Tunkhannock and Chenango soils, 25 to 60 percent slopes	1,700	.4
Tunkhannock cobbly sandy loam, 0 to 5 percent slopes	170	(1)
Volusia channery silt loam, 0 to 3 percent slopes	360	.1
Volusia channery silt loam, 3 to 8 percent slopes	6,090	1.5
Volusia channery silt loam, 8 to 15 percent slopes	5,950	1.5
Volusia, Morris and Erie very stony soils, 0 to 15 percent slopes	15,360	3.8
Wayland silt loam	1,460	.4
Unmapped borrow pits, gravel pits, and quarries	300	.1
Water	1,320	.3
Total	400,000	100.0

[1] Less than 0.05 percent.

Allis Series

The Allis series consists of moderately deep, somewhat poorly drained or poorly drained soils that are depressional to gently sloping. These soils are in the uplands in the northeastern part of the county in areas where runoff is slow or that receive runoff from nearby uplands. They formed in thin deposits of moderately fine textured, acid glacial till. Depth to shale bedrock generally ranges from 20 to 36 inches.

These soils are near the shallow Arnot, Nassau, and Tuller soils and the moderately deep Lordstown and Oquaga soils.

A profile of Allis soils generally has a dark grayish-brown, friable silt loam plow layer 7 to 8 inches thick. The next layer is a faintly mottled, pale-brown, friable silt loam 2 to 6 inches thick. Just below is a subsoil of mottled, dark-gray, firm shaly silty clay that rests on dark-colored shale bedrock.

The Allis soils are wet and cold early in spring because they are saturated to a depth of a few inches from the surface. The wetness makes plowing difficult in many places until early in June. By the middle of June, however, the surface is dry except for a few days after a heavy rain. The moisture-holding capacity is low to moderate. The more shallow areas have a lower moisture-holding capacity, and plant growth is limited by lack of sufficient moisture in midsummer.

Unlimed Allis soils are strongly or very strongly acid. Lime is needed for good growth of forage crops. The supply of nitrogen is moderately high, but the nitrogen is not readily available to plants in spring. Plants on these soils respond if nitrogen is added, especially if it is applied late in spring and early in summer. Most plants on these soils also require phosphorus and potassium for good growth.

In this county the Allis soils are mapped only in undifferentiated units with the Tuller soils. A profile typical for the Tuller series and the mapping units are described under that series.

Alluvial Land

Alluvial land (0 to 5 percent slopes) (Al) consists of soils and of recent deposits of sand, silt, and gravel and of riverwash that are so intermingled it was not feasible to map them separately. Alluvial land is on low, level to nearly level terraces along rivers and small streams.

The soils that make up this land type are excessively drained to very poorly drained. Drainage generally is very poor along the smaller streams and excessive in some cobbly areas. Coarse fragments make up from less than 5 percent to as much as 90 percent of the soil material. Reaction ranges from very strongly acid to neutral.

Alluvial land is flooded frequently and generally is not suited for farm crops. Some areas provide limited pasture. (Capability unit Vw–1; woodland suitability group not assigned)

Appleton Series

The Appleton series consist of dark-colored, somewhat poorly drained, medium-textured soils that are nearly level to gently sloping and have a calcareous substratum. These soils are on a low plateau, chiefly in the northern part of the county, in areas that receive runoff from adjacent higher areas. They formed in glacial till that was high in lime.

These soils are near the higher lying Honeoye, Lansing, Lima, and Mohawk soils. They also are near the wetter Ilion and Lyons soils, which occupy low areas. Areas of Appleton soils that are near the Lansing soils are medium acid. They overlie till that is less calcareous than that underlying most areas of Appleton soils.

The Appleton soils commonly have a plow layer of dark grayish-brown, friable channery silt loam that is 5 to 9 inches thick. The next layer is distinctly mottled, brown and yellowish-brown, leached, friable channery silt loam that is 0 to 6 inches thick. It overlies distinctly mottled, olive-brown and gray, firm channery heavy silt loam or loam that is 5 to 11 inches thick. Just below is distinctly mottled, brown and grayish-brown, firm channery loam glacial till that is calcareous.

These soils are too wet to be tilled early in spring. At this time the water table is at or near the surface, but it starts to fall during May. The soils can then be worked except for 7 to 10 days after a rain. In June the soils generally can be plowed except for a day or two after a rain.

Because of the wetness, roots generally are confined to the uppermost 18 to 24 inches of these soils. Runoff from adjacent higher areas collects on the soils. Crops therefore continue to grow in dry summers when crops on better drained soils are damaged from lack of sufficient water. During long periods of drought, however, crops on these soils also are damaged.

Some areas of Appleton soils are medium acid and require lime; other areas are slightly acid to neutral and do not require lime. The content of organic matter and of nitrogen is high. Wetness, however, slows decomposition of the organic matter and the release of nitrogen is slow. Plants on these soils therefore need additional nitrogen, and they respond if it is applied early in spring and in wet summers. In drained areas, however, large amounts of nitrogen are released during warm weather and cause some lodging of small grains. The supply of potassium and phosphorus is moderate, and fertilizer containing these elements must be added for good growth of plants.

Wetness limits use of the Appleton soils, but if it is corrected, the soils are well suited to a wide variety of crops.

Appleton channery silt loam, 2 to 8 percent slopes (ApB).—This is the only Appleton soil mapped in the county. It is in the northern part.

Included with this soil are small areas of Conesus and Lansing soils on slightly convex knolls. Also included are some small wet areas of Lyons soils in seep spots and in depressions. In the northwestern part of the county are some included areas of a soil that is darker than is typical for the series and contains appreciable amounts of dark shale.

Appleton channery silt loam, 2 to 8 percent slopes, is suited to cultivated crops, pasture, and trees. In undrained areas the choice of crops is limited, but corn and small grains that are planted late in spring can be grown. Erosion is a hazard if the soil is used intensively. The use of the soil for many nonfarm purposes is limited by wetness. (Capability unit IIIw–5; woodland suitability group 5)

Arnot Series

In the Arnot series are shallow, well drained to moderately well drained, medium-textured soils that are nearly level to moderately sloping. These soils are widely distributed in that part of the county occupied by the higher parts of the Allegheny Plateau. The soils developed in a thin layer of glacial till that contained much gray or red sandstone and siltstone and smaller amounts of shale. Depth to bedrock ranges from 12 to 20 inches.

The Arnot soils occur mainly near the more poorly drained, shallow Tuller soils and the deeper Lordstown and Oquaga soils. They also are near the deep Cattaraugus, Culvers, and Mardin soils and the wetter Morris and Volusia soils.

A profile of Arnot soils commonly has a plow layer of very dark grayish-brown or dark-brown, friable flaggy silt loam that is 4 to 9 inches thick. This layer overlies dark yellowish-brown or dark reddish-brown, friable flaggy silt loam that is 4 to 12 inches thick and rests on sandstone or siltstone. A thin, faintly mottled, light olive-brown layer may or may not occur just above the bedrock. This thin layer indicates waterlogging for short periods in spring.

Because these soils are only 12 to 20 inches deep over bedrock, the moisture-holding capacity is low or very low. Plant growth consequently is restricted during dry periods.

The Arnot soils are very strongly acid, and liming is one of the most important concerns of management. Crops on these soils also need a complete fertilizer. The response depends upon the amount of moisture available.

Much of the acreage of the Arnot soils has been reforested or is idle and brushy. In some places stones and fragments of rock hinder tillage and harvesting. Hay or pasture is the chief use of areas that are still farmed.

Arnot flaggy silt loam, 0 to 15 percent slopes (ArC).—This is the only Arnot soil mapped in the county. It occupies nearly level areas on hilltops and moderately sloping areas on the sides of valleys. In many places the soil is on narrow "stairsteps" that have outcrops of sandstone and siltstone between the steps (fig. 5).

Included with this soil are small areas of wetter Tuller soils in the more nearly level areas. Also included are deeper Lordstown and Oquaga soils in more sloping areas.

Arnot flaggy silt loam, 0 to 15 percent slopes, can be used for crops, pasture, or trees. Shallowness to bedrock makes the soil droughty. In the more sloping areas, erosion and loss of moisture through runoff also are problems. If cultivated, the soil is better suited to grain crops that mature early and to shallow-rooted plants that can tolerate some dryness than it is to other crops. The use of this soil for

***Figure 5.*—Arnot flaggy silt loam on a landscape that has a "stairstepped" appearance.**

many nonfarm purposes is limited by shallowness to bedrock. (Capability unit IIIs-1; woodland suitability group 9)

Barbour Series

The Barbour series consists of deep, well-drained, medium-textured and moderately coarse textured soils on bottom lands. These soils are mainly along Schoharie Creek and its southern tributaries, though some areas are along Fox Creek. They formed in alluvium, mainly from red sandstone and siltstone.

These soils are near the moderately well drained Basher soils, the poorly drained and somewhat poorly drained Holly soils, and the very poorly drained Papakating soils. They also are near the Tioga soils along Fox Creek and are similar to them but are redder in color.

The plow layer of a typical Barbour soil is brown to dark-brown, very friable loam 6 to 8 inches thick. The subsoil is brown to reddish-brown, very friable loam to a depth of 24 to 38 inches. Just below are layers of dark reddish-gray or dark reddish-brown, friable sand, gravel, and silt.

In some places the Barbour soils are flooded for a short time in spring, but the floodwater generally recedes in 2 or 3 days. The soils then dry quickly and can be tilled a few days after the floodwater recedes.

The Barbour soils are loose and porous and are readily permeable to air and water. Roots easily penetrate these soils to a depth of 36 to 40 inches. The water-holding capacity is good, and plants seldom are damaged by drought.

These soils are strongly acid to slightly acid. The supply of available nitrogen, phosphorus, and potassium is moderate. Crops on these soils respond well if a complete fertilizer is added.

The Barbour soils are among the most productive soils in the county. In this county they are mapped only with the Tioga soils in undifferentiated groups.

Barbour and Tioga fine sandy loams (0 to 5 percent slopes) (Ba).—The soils in this group are mainly along Schoharie Creek south of Middleburg. Except for the texture of the surface layer, each of these soils has a profile similar to the one described as typical for its respective series. Some areas are made up of the Barbour soil, others consist wholly of the Tioga soil, and still others are made up of both soils. Included are small areas in which the surface layer is sandy loam.

These soils are more subject to flooding than other Barbour and Tioga soils. Special measures are needed for control of streambank erosion and to keep channels from cutting through areas that are flooded frequently. The more frequently flooded areas are better suited to pasture and trees than to other uses. Otherwise, the soils can be used in about the same way as the other Barbour and Tioga soils. The supply of moisture generally is lower, however, and plants may not grow so well. (Capability unit I-2; woodland suitability group 2)

Barbour and Tioga gravelly loams, fans, 0 to 8 percent slopes (BbB).—The soils in this group are mainly on fans in areas where rapidly flowing streams join other streams. Each of these soils is gravelly but otherwise its profile is similar to the one described as typical for its respective series. Some areas are made up of the Barbour soil and others consist of the Tioga soil. Still other areas are made up of both soils.

Included with this group are small seeps and other wet areas along the edges of the fans. These included areas consist mainly of the somewhat poorly drained Holly soils and the very poorly drained Papakating soils.

These Barbour and Tioga soils can be used for crops, pasture or trees. The ability to supply moisture is slightly less than in the Barbour loams, but it generally is not limiting for plant growth. In some places gravel bars make tillage difficult. The areas are subject to flooding, and erosion is a hazard if the soils are left bare before seedings become established. Special practices are needed for control of streambank erosion. The flooding hazard limits use of these soils for nonfarm purposes. (Capability group IIe-2; woodland suitability group 2)

Barbour and Tioga loams (0 to 5 percent slopes) (Bg).—The soils in this group are level to slightly undulating and are mainly along major streams of the county. The largest areas are along Schoharie Creek. Some areas are made up only of the Barbour soil and others consist wholly of the Tioga soil. Still other areas are made up of both soils. Each of these soils has a profile similar to the one described as typical for its respective series.

Included with this group are small areas of the wetter Basher, Holly, Middlebury, and Papakating soils.

Under good management these Barbour and Tioga soils are suited to cultivated crops, pasture, or trees. Most areas are suited to vegetables and specialty crops and to the crops commonly grown to provide feed for livestock. In some places special measures are needed for control of streambank erosion, but otherwise little special management is needed. The flooding hazard limits use of many areas for most buildings and industries, though the higher areas are used as building sites. (Capability unit I-2; woodland suitability group 2)

Basher Series

The Basher series consists of deep, moderately well drained to somewhat poorly drained, medium-textured soils that are level to depressional. These soils are on bottom lands, mainly along Schoharie Creek and its southern tributaries. They developed in recent alluvium from red acid shale and sandstone. Depth to mottling caused by waterlogging ranges from 11 to 24 inches.

These soils are near the well-drained Barbour soils and the wetter Holly and Papakating soils. They also are near the Tunkhannock soils, which are on glacial outwash. Other nearby soils are the reddish Schoharie soils and their associates. Basher soils are similar to the Middlebury soils but are redder in color.

A profile of Basher soils commonly has a plow layer of dark-brown friable silt loam 6 to 11 inches thick. The subsoil is reddish-brown to brown, friable silt loam to very fine sandy loam to a depth of 24 to 36 inches. This layer is mottled at a depth of 11 to 24 inches. It overlies layers of mottled, dark grayish-brown to brown silt, sand, and gravel.

The Basher soils are flooded in many places early in spring. In April the water table is just below the surface. Consequently, for most of the month tillage is hindered by wetness. The water table drops significantly in May, and

then the soils can be tilled except for a few days after a heavy rain.

Roots grow mostly in the upper 20 to 24 inches of these soils. The water-holding capacity of the soils is good. Because of the relatively high water table, drought resistance also is good.

Basher soils are slightly acid to strongly acid. The content of organic matter in the plow layer is moderate, and the supply of nitrogen is moderately high. Release of nitrogen is quite slow, and plants on these soils require additional nitrogen for good growth. The supply of available potassium and phosphorus is moderate.

Flooding in spring limits use of these soils for many nonfarm purposes.

In this county Basher soils are mapped only with Middlebury soils in an undifferentiated soil group.

Basher and Middlebury silt loams (0 to 5 percent slopes) (Bm).—The soils in this mapping unit are nearly level to depressional and are mainly on bottom lands of major streams. Some areas consist only of Basher silt loam and other areas are made up wholly of Middlebury silt loam. Still other areas are made up of both soils. Each of the soils has a profile similar to the one described as typical for its respective series.

Included with these soils are small areas of better drained Barbour and Tioga soils and of wetter Holly and Papakating soils. The included soils generally occupy less than 15 percent of any area.

These Basher and Middlebury soils are suited to cultivated crops, pasture, and trees. Most areas are suited to specialty crops and to vegetables, though planting may be delayed because of wetness and flooding early in spring.

If these soils are used intensively, spot drainage is needed to improve the included areas of wetter Holly and Papakating soils. In some places special measures are needed for control of streambank erosion. Lime and fertilizer generally are needed for good growth of plants. Flooding and a water table that is at a depth of less than 2 feet in spring limit use of these soils for most building and industrial purposes. (Capability unit IIw–2; woodland suitability group 2)

Burdett Series

The Burdett series consist of gently sloping to moderately sloping, somewhat poorly drained soils. These soils are on low hills, or drumlins, in the northern part of the county and receive runoff from adjacent higher lying soils. They formed in silty deposits over compact clayey till, dominantly from dark-colored shale.

Burdett soils occur mainly with Erie soils and are similar to them but lack a fragipan. They are near the better drained Nunda soils and Langford soils. They also are near the Darien soils and are similar to them but have a silty mantle.

A profile of Burdett soils commonly has a plow layer of dark grayish-brown, very friable channery silt loam 6 to 10 inches thick. The upper part of the subsoil is mottled, dark-brown, friable channery silt loam 4 to 10 inches thick. It overlies a thin leached layer of distinctly mottled, grayish-brown, firm channery silt loam that is 1 to 4 inches thick. Just below is prominently mottled, gray or dark-gray, firm to very firm shaly silty clay loam. This lower part of the subsoil has blocky structure and extends to a depth of 30 to 48 inches. It overlies faintly mottled, dark grayish-brown, firm to very firm shaly silty clay loam glacial till.

Burdett soils generally are saturated early in spring, and the wetness delays tillage. Because of a dense slowly permeable layer, water stays in the uppermost 18 to 24 inches of these soils until the middle of May. At this time the water table begins to fall, and the soils can be worked except for several days after a heavy rain. In June the soils generally can be plowed except for a day or two after a rain.

Roots are confined mostly to the uppermost 18 to 24 inches of these soils because of wetness and because of a dense, heavy layer just below this depth. The water-holding capacity is good. Crops continue to grow on these soils in dry summers when crops on better drained soils are damaged by lack of sufficient moisture. During periods of prolonged drought, however, crops on these soils also are damaged. On the other hand, in years when rainfall is heavier than normal, crops on these soils are damaged by wetness.

Burdett soils are strongly acid to slightly acid in the upper part. Wetness slows decomposition of organic matter, and the release of nitrogen therefore is slow. Plants on these soils need additional nitrogen early in spring and in wet summers. In drained areas, however, large amounts of nitrogen are released in warm summers and may cause lodging of small grains. The supply of potassium and phosphorus is moderate. Fertilizer that contains these plant nutrients is needed for good growth of most crops. In particular, the response of most crops to phosphorus is good if it is applied at the time of seeding.

Most areas of Burdett soils contain fragments of sandstone and shale that interfere slightly with tillage. If wetness and acidity are corrected, most forage crops grow well on these soils.

In this county Burdett soils are mapped only with Erie soils in undifferentiated groups.

Burdett and Erie channery silt loams, 3 to 8 percent slopes (BrB).—Some areas of this group consist only of the Burdett soil or of the Erie soil, but other areas consist of both soils. Each of these soils has a profile similar to the one described as typical for its respective series.

Included with these soils are small areas of Ilion and Lyons soils in depressions. Also included are small areas of Nunda and Langford soils on knolls.

Unless drained, these Burdett and Erie soils are limited to plants that tolerate some wetness. Shallow-rooted legumes and grasses that tolerate wetness are well suited. Corn, barley, and similar crops that are planted late in spring may do well, especially if grown in years that are drier than nomal. The soils also can be used for pasture and as woodland.

Wetness limits use of these soils for building sites or for recreational purposes. A heavy, compact layer in the lower part of these soils limits drainage and is a serious hazard to operation of septic tanks. (Capability unit IIIw–4; woodland suitability group 5)

Burdett and Erie channery silt loams, 8 to 15 percent slopes (BrC).—Some areas of these soils are made up only of the Burdett soil, and others are made up wholly of the Erie soil. Still other areas consist of both soils. Each of these soils has a profile similar to the one described as typical for its respective series. The soils in this group

are near areas of Burdett and Erie channery silt loams, 3 to 8 percent slopes, but they are not so wet as those soils.

Included with these soils are small wet areas of Ilion and Lyons soils. Also included are small areas of better drained Nunda and Langford soils.

Under good management these Burdett and Erie soils can be used for row crops. They also can be used for pasture or woodland. These soils are especially well suited to grasses and legumes that tolerate wetness. If these soils are used for building sites or for recreational areas, water control is a serious problem. (Capability unit IIIe–11; woodland suitability group 5)

Cattaraugus Series

Soils of the Cattaraugus series are deep, well drained, medium textured, and moderately steep to steep. These soils are widely distributed on slopes of the Allegheny Plateau in the southern part of the county. They formed in reddish glacial till that contained much red sandstone and siltstone. A dense fragipan that restricts drainage is at a depth of 20 to 36 inches.

The Cattaraugus soils generally are near the moderately well drained Culvers soils and the somewhat poorly drained Morris soils. They also are near the shallow Arnot soils and the moderately deep Oquaga soils. Other nearby soils are the poorly drained and very poorly drained Norwich soils in depressions and on flats.

A profile of Cattaraugus soils commonly has a plow layer of dark reddish-gray, friable stony silt loam 6 to 10 inches thick. The subsoil is reddish-brown to yellowish-red, firm stony loam or silt loam to a depth of 20 to 36 inches. It overlies a brittle fragipan of extremely firm and dense, reddish-brown very channery or channery loam or silt loam glacial till. A thin, pinkish-gray, leached layer may occur just above the fragipan.

In the Cattaraugus soils the root zone generally is confined to the 20 to 36 inches of soil above the slowly permeable fragipan. The moisture capacity above the fragipan ranges from moderate to high. The Cattaraugus soils are strongly acid, and correcting acidity is one of the most important concerns of management. The supply of nitrogen, phosphorus, and potassium is moderate.

Cattaraugus stony silt loam, 15 to 25 percent slopes (CaD).—This soil has the profile described as typical for the series. The soil is on the sides of moderately steep, smooth hills.

Included with this soil are small areas of wetter Morris and Norwich soils in small drainageways that cut through the areas in the direction of the slope. Also included are small areas of moderately well drained Culvers soils.

This Cattaraugus soil is suited to cultivated crops, pasture, and trees. Slopes, strong acidity, stones, hazard of erosion, and loss of moisture through rapid runoff are major limitations. The use of farm machinery is hazardous. Row crops therefore should be grown infrequently. Sod crops are more suitable and also help to control erosion. The slopes and stones limit use of this soil for many nonfarm purposes. (Capability unit IVe–3; woodland suitability group 3)

Cattaraugus stony silt loam, 25 to 35 percent slopes (CaE).—This soil is on the sides of valleys and hills. Included in mapping are small areas of Arnot and Oquaga soils, which are shallow and moderately deep, respectively, to bedrock. Also included are small areas of Morris and Norwich soils in seeps.

This Cattaraugus soil is too steep to cultivate with modern farm machinery. It is suited to native pasture and to trees. The use of the soil for many nonfarm purposes is limited by the steep slopes and many stones. (Capability unit VIe–1; woodland suitability group 4)

Chenango Series

The Chenango series consists of deep, well-drained, gravelly soils that are nearly level to steep. These soils are on glacial terraces and hills or are on deltas and alluvial fans. They formed in glacial outwash that consisted mainly of acid, gray sandstone and shale.

The Chenango soils are near the somewhat poorly drained Red Hook soils. They also are near the Chippewa, Lordstown, Marden, and Volusia soils, which are in the uplands, and the Middlebury and Tioga soils, which are on bottom lands. Chenango soils are similar to Tunkhannock soils, which formed in red outwash. They also are similar to Howard soils, which are richer in lime.

A profile of Chenango soils commonly has a plow layer of dark-brown, friable gravelly silt loam 7 to 9 inches thick. The upper part of the subsoil is brown, friable gravelly silt loam 6 to 9 inches thick. The lower part of the subsoil, which does not occur in all places, is olive-brown, very friable, very gravelly sandy loam less than 6 inches thick. The underlying material is variable. It consists of dark grayish-brown, loose sand and gravel.

The moisture-holding capacity generally is moderate in the uppermost 30 to 40 inches of soil, though in the steeper areas the soils are droughty. Deep-rooted crops and trees penetrate readily far into the underlying gravelly material, but most crops grown obtain moisture from the uppermost 30 to 40 inches of soil. Consequently, after 7 to 10 days without rain, many plants on these soils are likely to be damaged from lack of moisture.

The Chenango soils are strongly acid or very strongly acid in the surface layer. The supply of nitrogen, phosphorus, and potassium in the soils is moderate.

In the level to gently sloping areas, Chenango soils have good potential for crops. Lime and fertilizer are needed. Lack of moisture limits growth of plants in some years.

In this county Chenango soils are mapped only in undifferentiated units with Tunkhannock soils. A profile typical for the Tunkhannock series and the mapping units are described under that series.

Chippewa Series

Chippewa soils are deep, poorly drained, and medium textured. These soils are in slight depressions, in drainage channels, and in seeps on the sides of hills. The areas are mainly in uplands in the southern part of the county and receive water from ajacent higher lying soils. Chippewa soils formed in gray, acid glacial till. They have a fragipan at a depth of 10 to 15 inches.

The Chippewa soils are near the well drained and moderately well drained Mardin soils. They also are near the somewhat poorly drained Volusia soils.

In uncultivated areas the topmost layer in Chippewa soils commonly consists of a very thin mossy mat that is

only slightly decomposed. This layer overlies very dark gray or gray, friable stony silt loam that is 3 to 6 inches thick. The next layer is dark grayish-brown, friable stony silt loam 0 to 5 inches thick. It merges with faintly mottled, leached, grayish-brown, firm stony silt loam that is 7 to 10 inches thick. Just below is a fragipan of prominently mottled, gray to grayish-brown, very firm, dense stony silt loam. This fragipan is 10 to 20 inches thick. It gradually merges with equally firm and dense, mottled, gray very channery loam glacial till.

In cultivated areas the uppermost two layers, and in many places part of the third layer, form a plow layer of very dark grayish-brown or grayish-brown stony silt loam 6 to 8 inches thick.

Chippewa soils generally are more than 40 inches deep, but in a few places bedrock is at a depth of 20 to 40 inches.

The water table is at or near the surface of Chippewa soils for long periods each year. It is at a depth of 6 to 8 inches early in spring, and the soil is too wet to be tilled. By June the water table is at or near the fragipan between rains, and the soils can then be tilled after several dry days. Because of wetness Chippewa soils remain cold until late in spring, and plants do not grow much until the middle of May. In summer the supply of moisture normally is sufficient for plant growth.

Chippewa soils are acid. Lime is needed for good growth of crops. The content of organic matter and nitrogen is high. The nitrogen, however, is released too slowly to be readily available for crops. Plants on these soils therefore need nitrogen and respond when it is added. In drained areas the release of nitrogen is more rapid, especially in summer when decomposition of organic matter increases. This more rapid release of nitrogen may cause lodging of small grains. The supply of phosphorus and potassium is moderate, and fertilizer containing these elements is needed for good growth of crops.

In this county Chippewa soils are mapped only with Norwich soils in undifferentiated groups.

Chippewa and Norwich stony silt loams, 0 to 3 percent slopes (ChA).—This group of soils occupies nearly level, flat, and slightly depressional areas in the uplands in the southern part of the county. The areas receive runoff from higher areas and are wet. Some areas consist only of the Chippewa soil, other areas consist wholly of the Norwich soil, and still other areas are made up of both soils. Each of these soils has a profile similar to the one described as typical for its respective series.

Included with these soils are small areas of muck and peat in depressions and on flats. Other included small areas consist of somewhat poorly drained Morris or Volusia soils on slightly convex knolls.

Much of the acreage of these Chippewa and Norwich soils is too wet for cultivation unless an extensive drainage system is installed. Better uses are for pasture or trees or wildlife habitats. Lime and fertilizer are needed for good growth of pasture plants. Trees that tolerate wetness are the only ones that grow well on these soils. Wetness makes the soils undesirable for housing sites or for some recreational purposes. Generally, however, the soils are good sites for ponds. (Capability unit IVw–3; woodland suitability group 10)

Chippewa and Norwich stony silt loams, 3 to 15 percent slopes (ChC).—This group of soils generally occupies concave slopes in small seeps on the sides of hills. The areas receive much runoff from adjacent higher lying soils and are wet. Some areas of this group consist only of the Chippewa soil, other areas consist wholly of the Norwich soil, and still others are made up of both soils. Each of these soils has a profile similar to the one described as typical for its respective series.

Included with these soils are small areas of Morris and Volusia soils on better drained, convex slopes. These included soils make up as much as 15 to 20 percent of some areas.

These Chippewa and Norwich soils are too wet for cultivation unless drainage is provided. A better use is for pasture, but lime and fertilizer are needed for good growth of pasture plants. Pastures on these soils provide a limited amount of forage in dry periods when other pastures have been damaged by drought. Trees that tolerate wetness grow well on these soils. Use of the soils for housing sites, recreational areas, or similar purposes is not feasible because of the wetness. The more gently sloping areas generally are good sites for ponds. (Capability unit IVw–3; woodland suitability group 10)

Chippewa and Norwich very stony soils, 0 to 15 percent slopes (CnC).—The soils in this group are generally nearly level to slightly depressional and are in the uplands in the southern part of the county. Some areas, however, are in seeps on the sides of hills and have slopes of as much as 15 percent. All areas receive runoff from adjacent higher lying soils and are wet. Some areas consist wholly of the Chippewa soil, other areas are made up only of the Norwich soil, and still other areas consist of both soils. Except for the texture of the surface layer, each of these soils has a profile similar to the one described as typical for its respective series.

Included with these soils are small areas of muck and peat that are nearly level to depressional. Also included are small areas of better drained Morris and Volusia soils.

These Chippewa and Norwich soils are too wet and stony for cultivation. They are better suited to native pasture, to trees, or to use as wildlife habitats. The stones and wetness limit use of the soils for pasture. They also make the areas undesirable as sites for housing, for recreation, or for similar purposes. (Capability unit VIIs–2; woodland suitability group 10)

Conesus Series

Soils of the Conesus series are deep, moderately well drained, and medium textured. These soils are nearly level to moderately steep and are in the northern part of the county. They formed in moderately calcareous glacial till.

The Conesus soils are near the well-drained Lansing soils, the somewhat poorly drained Appleton soils, and the very poorly drained Lyons soils.

A profile of Conesus soils commonly has a plow layer of dark grayish-brown, friable channery silt loam 7 to 10 inches thick. This layer overlies a layer of leached, yellowish-brown, friable channery silt loam that is 3 to 5 inches thick. The upper part of the subsoil is faintly mottled, brown, firm channery silt loam that is 10 to 20 inches thick. The lower part of the subsoil is distinctly mottled, dark grayish-brown to olive-brown, firm channery silt loam to a depth of 30 to 48 inches. These subsoil layers contain more clay than the other layers in the profile. The underlying material consists of mottled, dark grayish-

brown, very firm channery loam glacial till that is neutral to calcareous.

When frost leaves the ground early in spring the Conesus soils are saturated. They normally are too wet to be tilled in April. By May the soils have dried out to a depth of 18 to 20 inches and can bear farm machinery 4 to 6 days after a rain. In June the soils can be tilled except for 1 or 2 days after a rain.

The roots of most crops grow mainly in the uppermost 16 to 20 inches of soil, though a few roots extend deeper into the profile. Deep-rooted legumes send their roots to the top of the dense calcareous till. In most years the supply of moisture is sufficient for most crops. During midsummer in periods of extended drought, however, crops are damaged from lack of moisture.

In unlimed areas the uppermost 16 to 24 inches of Conesus soils is medium acid to strongly acid. The material below is medium acid to neutral. Lime is needed for good growth of crops.

Conesus soils have a moderate supply of plant nutrients. They are moderately high in nitrogen but release it so slowly in the cool, wet spring that crops respond readily if nitrogen fertilizer is applied at this time. Even in midsummer, when release of nitrogen is more rapid, crops also respond to nitrogen fertilizer. The supply of phosphorus is moderate, but additional phosphorus is needed for good growth of crops. The supply of potassium in the Conesus soils is higher than in soils in the southern part of the county. Nevertheless, additional potassium is needed for good growth of the crops commonly grown.

Conesus channery silt loam, 2 to 10 percent slopes (CoB).—This soil is in slightly convex areas and generally is wetter than Conesus channery silt loam, 10 to 20 percent slopes. Most areas are large and are dominant in entire fields.

Included with this soil are small areas of well-drained Lansing soils and of somewhat poorly drained Appleton soils.

This Conesus soil is well suited to cultivated crops, pasture, and trees. Most areas are used for corn, small grains, and hay. Removal of excess water may be needed for good crop growth in the more gently sloping areas. The steeper areas require protection from erosion. Use of this soil for housing sites and for many other nonfarm purposes is moderately limited by wetness. (Capability unit IIe–4; woodland suitability group 1)

Conesus channery silt loam, 10 to 20 percent slopes (CoC).—This soil is on the sides of valleys and in dissected areas in the uplands where lateral streams have cut into the glacial till. It is better drained than Conesus channery silt loam, 2 to 10 percent slopes. Most areas are small and occur in fields dominated by that soil or by more strongly sloping well-drained Lansing soils. Small areas of somewhat poorly drained Appleton soils and of well-drained Lansing soils are included.

This Conesus soil is suited to cultivated crops, pasture, and trees. The steeper areas are better suited to sod crops grown for a long time than to other crops because some slopes are so steep that they hinder use of farm machinery. Runoff is moderate to rapid.

Under good management that includes control of runoff and erosion, tilled crops can be grown on this soil. Drainage generally is not needed, though some wet spots may need tile drainage. Lime and fertilizer are needed for good growth of crops. The drainage, and in some places the slope, moderately limit use of the soils for many nonfarm purposes. (Capability unit IIIe–5; woodland suitability group 1)

Culvers Series

In the Culvers series are deep, moderately well drained soils that are gently sloping to moderately steep. These soils generally occupy slightly convex, long, smooth slopes in the uplands in the southern part of the county. They formed in glacial till that was derived mainly from red sandstone and siltstone but that contained small amounts of red shale. A dense fragipan at a depth between 16 and 24 inches restricts downward movement of water and limits the depth to which roots can penetrate.

Culvers soils are near the deep, well-drained Cattaraugus soils and the moderately deep Oquaga soils. They occupy slightly higher areas than the somewhat poorly drained Morris soils. Nearby, in level and depressional areas, are the wet Norwich soils.

The surface layer of the Culvers soils commonly is dark-brown, very friable stony silt loam 4 to 10 inches thick. The upper part of the subsoil is reddish-brown, friable stony silt loam that is 9 to 20 inches thick and generally is faintly mottled in the lower part. The next layer is mottled, light-brown or pinkish-gray, leached, firm channery loam 1 to 5 inches thick. It overlies a fragipan of extremely firm and dense, reddish-brown to reddish-gray channery silt loam. Equally firm and dense, reddish-brown channery silt loam glacial till is at a depth of 48 to 60 inches. Boulders are common throughout the profile.

The root zone in these soils generally is confined mainly to the 16 to 24 inches of soil above the slowly permeable fragipan. The available moisture capacity above the fragipan is moderate to high. Early in spring a perched water table occurs above the pan. By the middle of May the water table has fallen, and the soil then is wet for only a few days after a rain. In dry periods plants on these soils are damaged from lack of moisture after 10 to 15 days without rain.

Soils of the Culvers series are strongly acid. The supply of available nitrogen, phosphorous, and potassium is moderate. Lime and fertilizer are needed for good growth of crops.

The use of these soils for many nonfarm purposes is limited by the many stones, wetness in spring, and depth to the fragipan.

Culvers stony silt loam, 2 to 8 percent slopes (CuB).—This soil generally is on long, smooth slopes of the Allegheny Plateau in the southeastern part of the county. It is slightly wetter than Culvers stony silt loam, 8 to 15 percent slopes, which has the profile described for the series. The fragipan also generally is nearer the surface and the well-aerated material just above the fragipan is less thick.

Included with this soil are small areas of Morris soils. Also included are small areas of Arnot and Oquaga soils that are shallow and moderately deep to bedrock. Other included small areas consist of Norwich soils in seeps and in depressions.

This Culvers soil is suited to cultivated crops, pasture, or trees. It is well suited to many of the commonly grown forage crops. The erosion hazard is moderate. Excess water and stoniness are minor hazards if the soil is used for

housing or recreational sites. (Capability unit IIe–6; woodland suitability group 2)

Culvers stony silt loam, 8 to 15 percent slopes (CuC).—This soil has the profile described for the series. Slopes are mainly long and smooth, though some areas are hilly and are cut in places by small drainage channels.

Included with this soil are small areas of well-drained Cattaraugus soils on knobs. Also included are small areas of wetter Morris and Norwich soils.

This Culvers soil is suited to cultivated crops, pasture, and trees. If lime and fertilizer are applied in adequate amounts and if management otherwise is good, growth of plants is good. In cultivated areas practices are needed for control of runoff and erosion. Wetness in spring, depth to the fragipan, and the many stones on and in the soil limit use of this soil for many nonfarm purposes. (Capability unit IIIe–6; woodland suitability group 3)

Culvers stony silt loam, 15 to 25 percent slopes (CuD).—This soil generally is slightly drier than Culvers stony silt loam, 8 to 15 percent slopes. Many areas are on slopes at the foot of long, steep hills.

Included with this soil are small areas of the well-drained similar Cattaraugus soils and the moderately deep Oquaga soils. Also included are small areas of the wetter Morris and Norwich soils in seeps.

Difficulty of working the steep slopes, excessive runoff, and hazard of erosion limit use of this Culvers soil for cultivated crops. The moisture held for plant use also may be in short supply. Better uses of this soil are for sod crops, pasture, and trees. The use of this soil for many nonfarm purposes is limited by the steep slopes and many stones. (Capability unit IVe–3; woodland suitability group 3)

Darien Series

Soils of the Darien series are dark colored, moderately well drained or somewhat poorly drained, and nearly level to steep. These soils are in the uplands in the northern part of the county. They generally are on smooth slopes or on undulating ground moraines and generally are dominant in an entire field. Darien soils formed in dark-colored, moderately fine textured glacial till that was calcareous. The till was derived mainly from soft clayey shale or from reworked lake-laid deposits that had a high content of clay.

Darien soils are adjacent to but below areas of Mohawk and Honeoye soils in some places. They also are above areas of Ilion, Lyons, and Madalin soils that are in low areas and depressions. Some areas are near Nunda, Langford, and Burdett soils.

The plow layer of Darien soils commonly is very dark grayish-brown, very friable silt loam 5 to 13 inches thick. It overlies distinctly mottled, leached, friable silt loam 2 to 10 inches thick. The upper part of the subsoil consists of distinctly mottled, dark grayish-brown, firm silty clay loam or shaly silty clay loam 4 to 13 inches thick. The lower part is distinctly mottled, gray, firm silty clay loam or shaly silty clay loam. Prominently mottled, gray, firm or very firm and dense shaly silty clay loam or clay loam glacial till is at a depth of 24 to 48 inches. The till is neutral to calcareous.

Because they are saturated, most areas of the Darien soils are too wet to be tilled early in spring. At this time the water table is at or near the surface. In May the water table starts to fall and the soils dry out enough so they can be worked except for 7 to 10 days after a rain. In June the soils normally can be plowed except for a day or two after a rain.

Because of the wetness plant roots are confined mainly to the uppermost 18 to 24 inches of these soils. The available moisture holding capacity is high. In dry summers crops on these soils continue to grow when crops on better drained soils are damaged from lack of water. During long periods of drought, however, these soils dry out and crops on them also are damaged.

Darien soils are slightly acid to neutral. Lime is needed in some areas for good growth of crops but is not needed in other areas. The content of organic matter in the surface layer is high. Wetness, however, slows decomposition of the organic matter, and release of nitrogen is slow. Plants on these soils therefore need additional nitrogen, and they respond if it is applied early in spring and in wet summers. In drained areas, on the other hand, large amounts of nitrogen are released during the summer and may cause lodging of small grains. The supply of potassium is higher than in less clayey soils, but it is likely to be released too slowly to be sufficient for crops that grow rapidly. The supply of phosphorus is moderate.

Darien channery silt loam, 2 to 8 percent slopes (DaB).—This soil is in the northern part of the county in low areas between drumlinlike hills. The surface layer, a dark grayish-brown channery silt loam, is more acid than that in the profile described for the series. It overlies prominently mottled channery silt loam. Many fragments of shale, sandstone, and limestone occur in the profile. Depth to calcareous material ranges from 30 to 50 inches. Included are many small areas of Burdett and Nunda soils.

Cultivated crops, pasture, and trees can be grown on this soil. Unless the soil is drained, however, the choice of crops is limited. Barley, corn, and other crops planted late in the season do well, especially in years that are drier than normal. Shallow-rooted grasses and legumes that tolerate wetness are especially well suited.

Wetness prevents use of farm machinery on this soil early in spring and in fall after continued rain. The coarse fragments in the soil interfere only slightly with tillage. Removal of excess water is the chief concern of management, though erosion is a moderate hazard. The lower part of the soil and the underlying material are slowly permeable, and an extensive drainage system is therefore needed for disposal of septic tank waste. (Capability unit IIIw–4; woodland suitability group 5)

Darien channery silt loam, 8 to 15 percent slopes (DaC).—This soil occupies long slopes on the sides of hills. Runoff is rapid. Included are small areas of Nunda and Burdett soils.

Cultivated crops, pasture, and trees do well on this Darien soil, but practices are needed for control of erosion if cultivated crops are grown. The soil is well suited to sod crops that tolerate wetness and that are grown for a long time. Wet spots require drainage, and tile can be used for this purpose. If special care is used in designing and installing sewage effluent disposal systems, the soil provides good sites for community developments. (Capability unit IIIe–9; woodland suitability group 5)

Darien channery silty clay loam, 8 to 15 percent slopes, eroded (DcC3).—This soil generally occupies small

areas on the sides of hills within areas of other Darien soils. In most places from 10 to 25 percent of the original surface layer has been removed through erosion. In many places plowing has mixed all of the leached material just below the original plow layer with the remaining surface soil. In these places the present plow layer rests on more clayey material. Much of the material washed from this soil has accumulated on adjacent wetter areas of Ilion soils downslope.

The plow layer of this soil is low in organic matter. It absorbs water more slowly than Darien channery silt loam, 8 to 15 percent slopes. Thus, runoff and erosion are greater hazards. In addition, less nitrogen and less moisture are available for plants. The supply of available potassium is higher than in uneroded Darien soils and the supply of available phosphorus is about the same, but the supply of nitrogen is much less.

Fertility, wetness, and lack of moisture limit growth of crops on this soil. The areas can be used for pasture and trees, but their use for crops is limited. Sod crops grown for a long time are suitable, for they reduce runoff and help to control erosion. This soil provides good housing sites, though special care is needed in providing for disposal of sewage and in controlling erosion. (Capability unit IVe–5; woodland suitability group 6)

Darien silt loam, gently undulating, 2 to 8 percent slopes (DdB).—This soil occupies slightly convex areas. The areas are large, and in places this soil dominates an entire field. This soil is moderately well drained. The material just below the surface layer lacks prominent gray mottles, but otherwise the profile of this soil is similar to the one described for the series. Included are many small areas of wetter Ilion soils.

Most areas of this Darien soil are used for crops. Corn, small grains, and hay are well suited and are most commonly grown. The soil also is suited to pasture and to trees.

Erosion is a hazard in the steeper areas of this soil, and practices are needed for its control. Some small areas are wet and may require drainage. Areas of this soil provide good housing sites if care is used in designing and installing sewage effluent disposal systems. (Capability unit IIe–5; woodland suitability group 1)

Darien silt loam, undulating, 8 to 15 percent slopes (DdC).—This soil occupies convex areas. It is moderately well drained. Prominent gray mottles are lacking just below the surface layer, but otherwise the profile of this soil is similar to the one described for the series.

Included with this soil are small areas of similar Nunda soils. Also included are small areas of wetter Darien and Ilion soils.

This Darien soil is suited to cultivated crops, and most areas are in crops. Corn, small grains, and hay are most commonly grown. The soil also is suited to pasture and trees.

Runoff is rapid on this soil, and erosion is a hazard. Keeping cultivated crops to a minimum helps to slow runoff, conserve moisture, and control erosion. In places the slope is steep enough to make use of farm machinery difficult. The lower part of the soil and the underlying material are slowly permeable. Nevertheless, the areas provide good housing sites if care is used in designing and installing sewage effluent disposal systems. (Capability unit IIIe–5; woodland suitability group 1)

Darien silt loam, undulating, 15 to 25 percent slopes (DdD).—This moderately well drained soil is on the sides of hills in areas dominated by other Darien soils. Some areas are eroded. Included are small areas of wetter Ilion, Lyons, and Madalin soils in depressions and in seeps.

This Darien soil is suited to sod crops, pasture, and trees. It is too steep to be cultivated safely with modern farm machinery. (Capability unit IVe–7; woodland suitability group 1)

Darien silt loam, 2 to 8 percent slopes (DeB).—This is the most extensive Darien soil in the county. It is somewhat poorly drained and has the profile described for the series. The areas are large and dominate an entire field.

Included with this soil are small areas of wetter Ilion soils. Also included are small areas of moderately well drained Darien soils on knolls.

This Darien soil can be used for cultivated crops, pasture, or trees. Unless the soil is drained, however, the choice of plants is limited to those that can tolerate wetness. Barley, corn, and other crops planted late in the season do well, especially in years that are drier than normal. Shallow-rooted grasses and legumes that tolerate wetness are especially well suited.

Wetness prevents use of heavy machinery on this soil early in spring and in fall after continued rain. If the areas are used for community developments or for recreational purposes, wetness must be controlled. (Capability unit IIIw–4; woodland suitability group 5)

Darien silt loam, 8 to 15 percent slopes (DeC).—This soil is on hillsides in the northern part of the county. Included are small wet areas of Ilion, Lyons, and Madalin soils.

Because of the slopes, runoff is rapid on this Darien soil and erosion is a hazard. The slopes also are steep enough to make use of farm machinery somewhat difficult. Wetness further limits use, though crops can be grown under good management. Grasses and legumes that tolerate wetness are especially adapted. If the areas are used for building sites or for recreational purposes, control of water is a serious problem. (Capability unit IIIe–9; woodland suitability group 5)

Darien silty clay loam, 2 to 8 percent slopes, eroded (DsB3).—This soil has lost most of its original surface layer through erosion, but its profile otherwise is similar to the one described for the series. Plowing has mixed much of the leached layer formerly underlying the surface layer, and in places the upper part of the layer just below, with the remaining surface layer. The present plow layer is finer textured than the original one. It also is lighter colored and contains less organic matter.

This soil is suited to sod-forming crops, pasture, and trees. Cultivated crops are less suitable because the moderately fine texture and poor structure in the surface layer make the soil subject to erosion. The areas provide fair housing sites if special practices are used for control of water. Slow permeability makes disposal of septic tank waste a serious problem. (Capability unit IIIe–12; woodland suitability group 6)

Darien silty clay loam, undulating, 8 to 15 percent slopes, eroded (DuC3).—This soil is moderately well drained and has lost most of its original surface layer through erosion. Otherwise, it is similar to Darien silt loam, undulating, 8 to 15 percent slopes. Plowing has mixed much of the leached layer formerly underlying the

surface layer, and in places the upper part of the layer just below, with the remaining surface layer. The present plow layer is finer textured than the original one. It also is lighter colored and contains less organic matter. Included are small wet areas of Ilion and Lyons soils.

This Darien soil is suited to sod-forming crops, pasture, and trees. Its use for cultivated crops is limited, because the slope and the moderately fine texture and slow permeability of the surface layer make the soil subject to erosion. The areas provide fair housing sites if special practices are used for control of water. Slow permeability limits suitability of the areas for disposal of septic tank waste. (Capability unit IVe-2; woodland suitability group 6)

Erie Series

Soils of the Erie series are deep, somewhat poorly drained, and medium textured. They are gently sloping to undulating and are on till plains and benches in the northern part of the county. These soils formed in glacial till that consisted mainly of dark-colored shale and sandstone but that also contained small amounts of limestone and crystalline rock. A fragipan at a depth of 15 to 21 inches limits root penetration and movement of water.

The Erie soils occur mainly with the Burdett soils and are similar to them. They also are near the better drained Langford soils and the Darien and Nunda soils.

A profile of Erie soils commonly has a plow layer of very dark grayish-brown, friable channery silt loam 5 to 10 inches thick. The next layer is distinctly mottled, yellowish-brown to light olive-brown, friable channery silt loam or loam about 7 to 11 inches thick. It overlies prominently mottled, grayish-brown to light olive-brown, leached very channery loam that extends to a depth of 15 to 21 inches. Just below is a fragipan of extremely firm and dense, prominently mottled, gray channery loam. Firm and dense channery loam glacial till is at a depth of 30 to 40 inches. The till is calcareous.

In most areas these soils contain rock fragments and stones in numbers that interfere with tillage. Early in spring wetness delays tillage. At this time the soils are saturated because the water table is perched on top of the fragipan. By the middle of May, the water table starts to drop and the soils are dry enough to work. In June the soils normally can be plowed except for a day or two after a rain.

Because of the fragipan and the wetness, plant roots are confined mainly to the uppermost 15 to 21 inches of these soils. In wet summers plants on these soils are damaged by excessive moisture. During long periods of drought, however, the soils dry out and crops on them are damaged from lack of moisture.

Erie soils are strongly acid. Lime is needed for good growth of crops. The content of organic matter in the surface layer is moderately high. Wetness, however, slows decomposition of the organic matter, and release of nitrogen is slow. Plants on these soils therefore need nitrogen, and they respond if it is applied early in spring and in wet summers. In drained areas, on the other hand, large amounts of nitrogen are released in summer and may cause lodging of small grains. The supply of available potassium and phosphorus is moderate. Most crops require additional potassium for good growth. Plants on these soils generally respond if phosphorus is added, especially if it is added at the time of seeding.

If wetness and acidity are corrected, most forage crops grow well on the Erie soils. Shallow-rooted grasses and trefoils that tolerate wetness are some plants that grow well.

In this county Erie soils are mapped only in undifferentiated groups with Burdett soils. A profile representative of Burdett soils and the mapping units are described under the Burdett series.

Farmington Series

The Farmington series consists of shallow, well-drained to excessively drained, medium-textured soils. Most of these soils are nearly level to gently sloping and are on broad hilltops in the northern part of the county. Some of the soils are very steep and are on escarpments that have a thin cover of glacial till. Farmington soils formed chiefly in glacial till that was 10 to 20 inches deep over massive limestone. Outcrops of rock are common.

The Farmington soils occur mainly with the Honeoye and Mohawk soils in the low plateau area in the northern part of the county.

A profile of Farmington soils commonly has a plow layer of dark grayish-brown, friable silt loam 4 to 8 inches thick. Just below is a brown to dark-brown, very friable silt loam subsoil 6 to 12 inches thick. The next layer, which does not occur in all places, is mottled, brown, friable loam that is as much as 6 inches thick. Hard, massive limestone bedrock is at a depth of 10 to 20 inches.

Water moves rapidly through these shallow soils, and they cannot store large amounts of water. Plants on these soils therefore are damaged from lack of moisture during summer. Root penetration is good above the bedrock.

Farmington soils are slightly acid, and lime is needed for good growth of forage crops. The supply of available nitrogen, phosphorus, and potassium is moderate to low. Crops respond well to added nitrogen. Potassium and phosphorus fertilizers must be added for moderate growth of crops.

Acidity, shallowness to bedrock, and droughtiness are the chief limitations of Farmington soils. They make the soils undesirable for intensive farming.

Some Farmington soils are mapped in complexes with Honeoye soils. A profile representative of the Honeoye series and the mapping units are described under the Honeoye series.

Farmington very rocky silt loam, 0 to 10 percent slopes (FaB).—Some areas of this soil are on broad, flat hilltops in the low plateau area in the northern part of the county, and others are on benches along the edges of escarpments. Depth to limestone bedrock is about 18 inches. Outcrops of bedrock are common in most areas. Outcrops of rock, sinkholes, and deep cracks in the bedrock make tillage impractical in some places and impossible in most places.

Included with this soil are small areas of the deep Honeoye and Mohawk soils. Also included are small areas of Appleton and Lyons soils.

This Farmington soil is suited to pasture and trees. Pastured areas provide limited grazing early in spring and late in fall. Rock outcrops, sinkholes, and cracks in the underlying rock make pasture improvement difficult. Ex-

cept for a short time in spring, the soil holds little water available for plants. Water penetrates the soil readily, but it soon trickles into cracks or sinkholes and disappears. Plant growth generally is limited by lack of moisture. Because bedrock is so near the surface, this soil is of limited use as sites for houses or other buildings. (Capability unit VIs–3; woodland suitability group 9)

Farmington very rocky silt loam, 10 to 70 percent slopes (FaF).—This soil is in the low plateau area in the northern part of the county. It is on escarpments that have a thin cover of glacial till. Outcrops of bedrock are common, and the soil between the rocks generally is less than 20 inches thick.

Included with this soil are small areas of rocky land. Also included are small areas of deeper Honeoye and Mohawk soils.

This Farmington soil is too steep and rocky for farming. Use for pasture is limited to grazing early in June because little moisture is available and pasture plants grow slowly. Better uses are for woodland or some kinds of recreation. (Capability unit VIIs–1; woodland suitability group not assigned)

Fredon Series

In the Fredon series are somewhat poorly drained soils that occupy depressions in outwash plains. These soils are in valleys that drain high-lime soils on till in the northern part of the county. Fredon soils formed in deposits of calcareous, gravelly and sandy outwash and have a gravelly surface layer. An impermeable layer is at a depth of 4 or 5 feet, and the water table generally is high.

The Fredon soils occur mainly with the Halsey, Howard, and Phelps soils.

A profile of Fredon soils commonly has a plow layer of very dark brown, friable gravelly loam 6 to 10 inches thick. The next layer is mottled, grayish-brown, friable gravelly loam 3 to 9 inches thick. It overlies mottled, grayish-brown to light olive-brown, friable gravelly loam that becomes very dark grayish brown with increasing depth. Mottled, very dark gray or very dark grayish-brown glacial outwash is at a depth of 24 to 40 inches. The outwash consists of layers of sand, silt, gravel, and clay that are neutral to calcareous.

Roots readily penetrate the upper part of these soils, but waterlogging keeps all but a few roots from reaching the large reserve of lime in the calcareous substratum.

The water table is at or near the surface of these soils early in spring, especially in years when rainfall is heavier than normal. As a result, the soils remain wet and cold until late in spring. At this time the water table begins to fall. By the middle of June the soils are dry enough for tillage. In years when rainfall is normal, the water table is in the lower part of the soil or is perched on the underlying layers for much of the year. The supply of moisture in the root zone is moderate.

Total nitrogen is high, but nitrogen is released very slowly in spring when the soils are wet. Nitrogen fertilizer therefore is needed for good plant growth. The supply of phosphorus and potassium is moderate in the Fredon soils. If these soils are drained and fertilized, crops grow well on them. In most drained areas the supply of moisture is sufficient for plant growth in midsummer.

In this county Fredon soils are mapped only in an undifferentiated unit with Halsey soils.

Fredon and Halsey gravelly loams (0 to 5 percent slopes) (Fh).—In most places these soils have slopes of less than 3 percent, but in places the slope is as much as 5 percent. The soils in this group consist of somewhat poorly drained Fredon soils and poorly drained or very poorly drained Halsey soils.

These soils are in depressions, are in areas that receive runoff, or are where the water table is seasonally high. Some areas of this group of soils are made up only of Fredon soils or only of Halsey soils. Other areas are made up of both soils. Each of these soils has a profile similar to the one described as typical for its respective series.

Included with these soils are small areas of Phelps soils on knobs. Also included are small areas of muck.

Wetness limits use of these Fredon and Halsey soils. Drained areas can be used for vegetables or other cultivated crops. Undrained areas are better suited to pasture than to crops, and the only trees that grow well are those that tolerate wetness. These soils are poorly suited for use as building sites for houses and industries or for use for most other nonfarm purposes. (Capability unit IIIw–1; woodland suitability group 8)

Halsey Series

The Halsey series consists of deep, very dark, poorly drained or very poorly drained soils that occupy depressions in outwash plains. These soils are in valleys that drain high-lime soils on till that are in the low plateau area in the northern part of the county. Halsey soils formed in deposits of calcareous, gravelly and sandy outwash. They consist mainly of layers of sandy and gravelly material, but in many places these layers are interbedded with thin layers of very fine sand and silt.

The Halsey soils occur mainly with the well-drained Howard soils, the moderately well drained Phelps soils, and the somewhat poorly drained Fredon soils.

A profile of Halsey soils commonly has a surface layer of very dark brown to dark-brown, very friable gravelly loam. This layer has a high content of organic matter and is 7 to 12 inches thick. The next layer is mottled, dark grayish-brown, firm to friable gravelly loam that is 9 to 12 inches thick and in most places is calcareous in the lower part. It overlies mottled, dark grayish-brown glacial outwash. The outwash consists of layers of sand, gravel, and silt that generally are calcareous.

The texture in the uppermost 20 inches of these soils is variable. It ranges from silt loam or loam to sandy loam and may or may not be gravelly or cobbly. The high water table and slowly permeable layers in the underlying material in some areas make the Halsey soils wet. In places in the very poorly drained areas, the surface layer is mucky. Depth to calcareous material ranges from 18 to 48 inches.

These soils are saturated most of the year, and the wetness generally makes tillage impossible. Grasses for hay can be grown in some areas that have not been drained, but before tilled crops can be grown most areas must be drained. Growth of plants is good if the soils are drained.

In undrained areas plant roots are confined to the uppermost 10 to 15 inches of Halsey soils. If the soils are drained, the root depth can be extended to 24 inches in most places.

Even in drained areas, however, the water table generally is at a depth of less than 3 feet.

In this county Halsey soils are mapped only with Fredon soils in an undifferentiated group. A profile typical of the Fredon series and the mapping units are described under that series.

Holly Series

Holly soils are deep, poorly drained or somewhat poorly drained, and medium textured. They occupy low areas on bottom lands that drain the high plateau area of the county. These soils formed in strongly acid to slightly acid alluvium from soils derived mainly from sandstone and shale.

The Holly soils are near the better drained Middlebury and Tioga soils and the wetter Papakating soils. They also are near the Barbour and Basher soils, which are on acid red alluvium.

The plow layer of Holly soils commonly is dark grayish-brown, firm silt loam 3 to 10 inches thick. It overlies mottled, dark grayish-brown to grayish-brown, firm to friable silt loam that is about 22 inches thick. Just below is mottled, olive-gray to dark-brown material that is mostly silt loam but includes layers of sand, silt, and gravel. Depth to the layers of sand, silt, and gravel generally is more than 40 inches.

Texture of the surface layer and of the layer just below generally is silt loam, but it is silty clay loam in some places.

Most areas of the Holly soils are flooded early in spring. During April the water table is at a depth of less than 6 inches, and water stands on the surface in many areas after a heavy rain. The water table starts to drop late in spring and is at a depth of more than 12 inches early in summer.

In undrained areas plant roots are confined mostly to the uppermost 12 inches of these soils. If excess water is removed, roots extend below this depth.

Undrained Holly soils are strongly acid to slightly acid and need lime for good plant growth. Total nitrogen is high, but the nitrogen is released very slowly in spring and early in summer. Plants therefore respond if nitrogen fertilizer is added. The ability to supply potassium and phosphorus is moderate if excess moisture is removed.

In this county Holly soils are mapped only in an undifferentiated unit with Papakating soils.

Holly and Papakating silt loams (Ha).—These soils occupy low areas on bottom lands and flood plains along streams. The areas are mostly in the southern part of the county. Some areas are made up only of Holly soils, others consist wholly of Papakating soils, and still other areas are made up of both soils. Each of these soils has a profile similar to the one described as typical for its respective series.

Wetness and flooding limit use of these soils. Undrained areas are better suited to pasture or wildlife marshes than to other uses. If suitable outlets are available, these soils can be drained and used for cultivated crops. The areas are too wet for community developments and for most recreational uses. (Capability unit IVw-4; woodland suitability group not assigned)

Honeoye Series

The Honeoye series consists of deep, well-drained, medium-textured soils that are gently sloping to steep. These soils are in the uplands in the low plateau area in the northern part of the county. They receive little or no runoff from adjacent areas. Honeoye soils formed in highly calcareous glacial till. They have good structure and are high in lime.

Honeoye soils are near the moderately well drained Lima soils, the somewhat poorly drained Appleton soils, and the poorly drained or very poorly drained Lyons soils formed in similar material. Also nearby are the shallow Farmington soils and soils of the Mohawk series and their associates. In the northwestern part of the county, where slopes are gentle to moderate, are the nearby Darien soils.

A profile of Honeoye soils commonly has a plow layer of dark grayish-brown, friable silt loam 4 to 9 inches thick. The next layer, which does not occur in all places, is brown, friable, leached silt loam less than 5 inches thick. It overlies a subsoil of brown to dark-brown, firm channery loam 15 to 35 inches thick. Just below is brown to dark-brown, firm and dense channery loam glacial till that is calcareous. Depth to bedrock generally is 8 feet or more.

Except for a few days after a rain, Honeoye soils are dry enough early in spring to support farm machinery. In June the soils can support farm machinery except for 1 or 2 days after a heavy rain.

The glacial till underlying these soils is firm and restricts penetration of roots. In most places the root zone is 24 to 30 inches thick. The water-holding capacity in the uppermost 24 to 30 inches of the soils is high. It is sufficient to sustain plant growth in midsummer for about 10 days without rain.

In some places Honeoye soils contain gravel and coarse fragments in amounts that interfere slightly with tillage. In other places the surface layer is almost free of fragments.

Honeoye soils are among the better soils for farming in the uplands of the county. In many areas lime is not needed or only small amounts of it are required. The supply of available nitrogen is moderate, and most plants require nitrogen fertilizer early in spring for good growth. The supply of available potassium is higher than in most soils in the uplands of the county, but potassium fertilizer must be added if good crop growth is desired. Available phosphorus is moderate, and this nutrient also must be added for good growth of crops.

In this county Honeoye soils are mapped in complexes with Farmington soils and in undifferentiated groups with Mohawk soils. The undifferentiated groups are described under the Mohawk series.

Honeoye-Farmington complex, 2 to 10 percent slopes (HfB).—This complex is on gently sloping to undulating hilltops or is on benches on the side of valleys. It is in the low plateau areas in the northern part of the county. Texture of the surface layer is mainly silt loam. Honeoye soil and a soil similar to Honeoye make up 60 to 70 percent of any one area, and Farmington soil, 30 to 40 percent. The Honeoye-like soil generally is less than 40 inches deep over limestone bedrock, but its profile otherwise is similar to the one described as typical for the Honeoye series. The profile of the Farmington soil is similar to the one described as typical for the Farmington series. Except for

areas of deeper Honeoye soil, most areas in this complex are underlain by limestone bedrock at a depth of 10 to 40 inches. Sinkholes and cracks in the limestone are common.

Included with these soils are small wet areas of Appleton and Lyons soils. These included soils make up less than 10 percent of the complex.

These Honeoye and Farmington soils are suited to cultivated crops, pasture, and trees. The hazard of erosion is moderate in the more sloping areas, but it ranges from none to slight in the more gently sloping areas. Where the Farmington soil is shallower over bedrock, it is likely to be droughty. Depth to bedrock limits use of this complex for many nonfarm purposes. (Capability unit IIe-1; woodland suitability group 1)

Honeoye-Farmington complex, 10 to 20 percent slopes (HfC).—This complex is in the northern part of the county, generally in small areas within areas of Honeoye-Farmington complex, 2 to 10 percent slopes. The surface layer generally is silt loam. The Honeoye soil generally is more than 40 inches deep over bedrock, but otherwise the soils in the two complexes are similar. The Honeoye soil makes up 60 to 70 percent of any one area, and the Farmington soil, 30 to 40 percent.

Included are many small areas of Mohawk and Lima soils. Also included are many small areas of very rocky Farmington soils.

Because of the slopes, runoff is rapid on the Honeoye and Farmington soils and use of farm machinery is somewhat hazardous. The soils are suited to cultivated crops, though the hazard of erosion is high if row crops are grown. They also are suited to pasture and trees. The slopes and depth to bedrock limit use of these soils for many nonfarm purposes. (Capability unit IIIe-1; woodland suitability group 1)

Howard Series

Deep, well-drained soils that are nearly level to moderately sloping make up the Howard series. These soils are on nearly level terraces in valleys or are in hilly areas where glaciers left deposits of gravelly outwash as they receded. The soils formed in calcareous, glacial deposits of gravel and sand.

Howard soils are near the moderately well drained, gravelly Phelps soils; the somewhat poorly drained Fredon soils; and the poorly drained or very poorly drained Halsey soils formed in similar materials. Nearby soils on glacial till are the Darien, Honeoye, and Mohawk soils and their associates. Other nearby soils are those of the Middlebury, Tioga, and Wayland series on flood plains of streams.

A profile of Howard soils commonly has a plow layer of dark grayish-brown, friable gravelly silt loam 4 to 8 inches thick. The next layer is yellowish-brown, friable gravelly silt loam 5 to 8 inches thick. It overlies a subsoil of yellowish-brown to brown, firm to friable very gravelly loam that contains enough clay to feel sticky when wet. At a depth of 40 to 60 inches is dark grayish-brown, calareous glacial outwash that is friable to loose. The outwash consists of layers of sand, silt, and gravel.

Water moves rapidly through these soils, and little water is lost through runoff during rains of normal intensity. The soils can be tilled early in spring because they dry out and warm up early.

Roots of deep-rooted plants readily penetrate deeply into the underlying material. The roots of most plants are confined to the uppermost 30 inches of these soils and obtain most of their moisture and nutrients from this volume of soil. Here, the water-holding capacity is high to moderate. After about 2 weeks of dry weather, however, most plants on these soils are damaged from lack of water.

The surface layer of the Howard soils is acid. The supply of available nitrogen in these soils is moderate, but the nitrogen is released rapidly in spring. Plants on these soils therefore need additional nitrogen and respond if it is applied. The supply of available phoshorus is moderate, and the supply of available potassium is moderate to low.

Howard gravelly silt loam, 0 to 5 percent slopes (HgA).—This nearly level to gently undulating soil is mainly in nearly level valleys and on flat or nearly level tops of gravelly deltas on the sides of valleys. Included are small areas of wetter Phelps soils.

This Howard soil is well suited to cultivated crops, pasture, or trees. Deep-rooted crops are especially suitable. Areas of this soil provide good housing sites. They also generally are a good source of gravel. (Capability unit I-1; woodland suitability group 2)

Howard gravelly silt loam, 5 to 15 percent slopes (HgC).—This soil has the profile described for the series. It occupies the edges of terraces in the valleys and small hilly areas in the uplands. Included are some small areas of wetter Phelps soils.

This Howard soil is suited to cultivated crops, pasture, and trees. Deep-rooted crops are especially suitable. Because of slope, there is a moderate hazard of erosion if this soil is used for cultivated crops and is not protected. Plants on this soil are likely to be damaged because of lack of moisture sooner than plants on Howard gravelly silt loam, 0 to 5 percent slopes. Areas of this soil provide good housing sites. They also generally are a good source of gravel. (Capability unit IIIe-2; woodland suitability group 2)

Hudson Series

The Hudson series consists of deep, moderately well drained or well drained, medium- to high-lime soils that are gently sloping to steep. These soils formed in grayish-brown, calcareous, lake-laid silt and clay. Most of the areas are in the northern part of the county along the valley of Cobleskill Creek or are in large depressions that formerly were occupied by glacial lakes. The areas receive little or no runoff from adjacent areas.

The Hudson soils are near the somewhat poorly drained Rhinebeck soils and the very poorly drained Madalin soils. They are similar to the Schoharie soils, which formed in red glacial-lake sediment, but are less extensive than those soils. Nearby are the Darien, Honeoye, and Mohawk soils on glacial till, and the Tioga soils on bottom lands.

A profile of Hudson soils generally has a plow layer of very dark grayish-brown, friable silty clay loam or silt loam 5 to 6 inches thick. The upper part of the subsoil is light olive-brown, firm silty clay loam that is leached in the uppermost part and has strong blocky structure. This layer is 5 to 9 inches thick. The lower part of the subsoil is dark grayish-brown or very dark grayish-brown, firm silty clay that is faintly mottled in the uppermost part and has moderate blocky structure. Depth to the substratum of

dark-brown, firm, calcareous clay ranges from 30 to 40 inches.

The lake-laid deposits in which these soils formed range from 2 to more than 20 feet thick over glacial till and outwash. Hudson soils generally are free of stones, but they contain gravel in places where the soils are fairly thin over outwash or glacial till.

Hudson soils are saturated early in spring. Where the ground thaws, they dry out readily, and by the early part of May they can support farm machinery except for a few days after a heavy rain. Roots of most plants on these soils are confined to the upper 10 to 20 inches of soil, where the available moisture capacity is moderate to high. The roots of alfalfa and of similar plants, however, follow cracks downward in the soil to a depth of more than 4 feet.

These soils vary in their need for lime. They have large reserves of potassium, but alfalfa and similar plants that use large amounts of potassium respond if this nutrient is applied. The supply of available phosphorus is moderately low, and that of available nitrogen is moderately high. The nitrogen, however, is released too slowly for rapid growth of plants. Both phosphorus and nitrogen therefore are needed for good crop growth.

In this county Hudson soils are mapped only in undifferentiated groups with Schoharie soils. A profile typical for the Schoharie series is described under that series. Also described under the Schoharie series are mapping units containing Hudson soils.

Ilion Series

In the Ilion series are dark-colored, poorly drained, high-lime soils that are shaly and nearly level to gently sloping. These soils formed in glacial till that contained much dark-colored shale. They are in the northern part of the county, mostly in small wet areas surrounded by better drained soils from which they receive runoff.

The Ilion soils occur mainly with Honeoye and Mohawk soils and their wetter associates. Ilion soils are similar to the Lyons soils but are finer textured. They are finer textured than the Chippewa soils, contain more lime, and lack a fragipan.

A profile of Ilion soils generally has a plow layer of very dark grayish-brown, friable silt loam 6 to 10 inches thick. The next layer, which does not occur in all places, is mottled, olive-gray, friable, leached silt loam less than 10 inches thick. It overlies a mottled, dark-gray or dark grayish-brown, firm silty clay loam subsoil that contains a few pebbles and chips of shale. At a depth of 15 to 40 inches is olive-brown, firm and dense, calcareous silty clay loam till. This material is slowly permeable and contains a moderate amount of pebbles and fragments of shale.

The surface layer is free of stones in most places, but it contains moderate amounts of stones and fragments of shale in other places. In many small areas material washed from adjacent, higher lying, eroded soils has been deposited on the Ilion soils. In some places the deposits are as much as 18 inches deep. Slopes are mainly 2 to 5 percent, though in some small seeps they are as much as 15 percent.

Early in spring Ilion soils are saturated and are too wet for tillage. At this time the water table is at or near the surface. During May the water table starts to fall and the soils can be worked except for a few days after a rain. Late in June the soils can be plowed except for a day or two after a rain. Because these soils are wet and cold, plants on them do not grow much until the middle of May.

In years of normal rainfall, the supply of moisture in these soils is adequate for plant growth. During long periods of drought, however, the water table falls beyond reach of most plants and crops are damaged from lack of moisture.

Ilion soils are slightly acid to neutral. The content of organic matter and nitrogen is high. Wetness, however, slows decomposition, and release of nitrogen is slow. Plants on these soils therefore need additional nitrogen, and they respond if it is applied. In drained areas, on the other hand, the organic matter decomposes rapidly in warm weather. As a result, nitrogen is released quickly and causes lodging of small grains. The supply of available phosphorus is moderate in these soils. Available potassium is moderately high, but it is released too slowly for rapidly growing plants.

Wetness limits use of the Ilion soils, but if it is corrected, the soils are well suited to forage crops.

In this county Ilion soils are mapped only in undifferentiated units with Appleton and Lyons soils.

Ilion and Appleton silt loams, 3 to 8 percent slopes (IaB).—The soils in this group occupy areas that receive runoff from adjacent, higher lying, better drained soils. The profile of the Ilion soil is like the one described as typical for the Ilion series. The Appleton soil lacks channery material in the surface layer, but otherwise its profile is similar to the one described as typical for the Appleton series. Some areas are made up of the Ilion soil, others consist of the Appleton soil, and still others are made up of both soils.

These soils are mostly in small areas. They occupy depressions and seepy areas or are along narrow drainageways. In many places these soils have a cover of soil material washed from adjacent higher lying soils.

These soils are suited to crops, pasture, and trees. In undrained areas the choice of crops is limited to plants that tolerate wetness. Small grains and grasses grown for hay are suitable for undrained areas, but the wetness makes harvesting difficult. These soils generally provide good sites for ponds. They are too wet for most community developments unless extensively drained. (Capability group IVw–2; woodland suitability group 8)

Ilion and Lyons silt loams, 0 to 3 percent slopes (IlA).—In most places these soils occupy small wet depressions. Most of the areas consist of the Ilion soil, others consist of the Lyons soil, and a few are made up of both soils. Each of these soils has a profile similar to the one described as typical for its respective series.

Soils in this group receive runoff from adjacent higher lying soils. The areas generally have a thin deposit of silt and clay on them that was washed from the higher areas. Most areas are in pasture or trees. The wooded areas have a thin, mucky surface layer in most places. In pastured areas mineral material from the upper part of the soil has been mixed with the mucky material.

Included with these soils on knolls are small areas of better drained soils from similar materials. Also included are small areas of muck.

Undrained areas of these Ilion and Lyons soils can be used for pasture, for woodland, or for wildlife areas. Plants that tolerate wetness are the only ones that are

suitable for undrained areas. Corn, small grains, and hay are suitable for drained areas. Small grains, however, are susceptible to lodging, because nitrogen is released rapidly in midsummer. Developing the areas as marsh for wildlife is a good use. The soils also provide good sites for farm ponds. Wetness limits use for most buildings and for many recreational purposes. (Capability unit IVw-1; woodland suitability group 8)

Ilion and Lyons silt loams, 3 to 15 percent slopes (IlC).—These soils are wet. They generally occupy concave slopes that receive much runoff from adjacent higher areas. Some small areas are in seeps and have slopes of as much as 15 percent. Most areas consist wholly of the Ilion soil or of the Lyons soil. A few areas are occupied by both soils. Each of these soils has a profile similar to the one described as typical for its respective series.

Included with these soils are small areas of better drained Appleton and Darien soils on convex slopes. These included soils generally occupy less than 15 percent of any area.

These Ilion and Lyons soils, unless they are drained, are too wet for cultivated crops, but they can be used for pasture or trees. Pastures on these soils require lime and fertilizer. They provide a limited amount of forage in droughty periods when other pastures have dried up. The only trees that grow well are those that tolerate wetness. (Capability unit IVw-2; woodland suitability group 8)

Lakemont Series

The Lakemont series consists of deep, fine-textured, poorly drained or very poorly drained, high-lime soils that are nearly level to gently sloping. These soils formed in reddish-brown, calcareous, lake-laid silt and clay. They are in basins that once were occupied by glacial lakes. Most areas are small and are within areas of better drained soils, but some areas are large or occupy long, narrow strips along natural drainageways.

The Lakemont soils are surrounded mainly by better drained Odessa and Schoharie soils. Other soils nearby are the Barbour on bottom lands.

A typical profile of Lakemont soils has a plow layer of very dark grayish-brown, friable silty clay loam that contains much organic matter and is 4 to 10 inches thick. The next layer, which does not occur in all places, is mottled, light brownish-gray, firm, leached silty clay loam less than 9 inches thick. It overlies a reddish-gray to dark-brown, firm silty clay subsoil that is distinctly mottled in the upper part. The substratum is reddish-brown, firm, calcareous silty clay and is at a depth of 24 to 48 inches.

The texture of the Lakemont soils is silty clay loam in most places, but it is silt loam in places. In many very poorly drained areas, the surface layer is mucky. Thickness of the surface layer generally is about 8 to 10 inches in the poorly drained areas, but it is as much as 16 inches in the very poorly drained areas. In places recent deposits of fine sand or silt, washed from nearby higher areas, thinly cover the Lakemont soils. The lower part of the profile, and the material underlying it, contains little material coarser than silt.

Free water stands at or near the surface of the Lakemont soils early in spring. The soils seldom can be plowed in April or early in May. Even in the better drained parts of these soils, 5 to 10 drying days are needed in May before the soils can be worked. The wetter areas can be plowed only in years that are drier than normal.

In undrained areas plant roots are confined mostly to the upper 8 to 10 inches of the Lakemont soils, though some plants that tolerate wetness send their roots deeper than this. In drained areas plant roots penetrate to a depth of 15 to 20 inches.

Lakemont soils generally are slightly acid to neutral. The total supply of nitrogen is high, but in spring the nitrogen is released too slowly for good plant growth. Available potassium in these soils is high, and available phosphorus is moderate.

Unless these soils are drained, they are too wet for cultivation. Wetness and fine texture limit use of the Lakemont soils for many purposes.

In this county Lakemont soils are mapped only in undifferentiated groups with Madalin soils.

Lakemont and Madalin soils, deep, 0 to 2 percent slopes (LaA).—These soils are in closed depressions and are mostly very poorly drained. Most of the areas consist of either the Lakemont soil or the Madalin soil. A few areas are made up of both soils.

Wooded areas of these soils generally have a mucky surface layer. In pastured areas mineral soil material has been mixed with mucky material to form a surface soil that generally is black mucky silty clay loam 6 to 14 inches thick. In places just below is a thin, gray layer that has few or no mottles. Otherwise, the profile of each of these soils is similar to the one described for its respective series. Small spots of muck are common inclusions.

Undrained areas of these soils are suited to unimproved pasture or to trees. They provide good sites for development of areas for wetland wildlife. They also generally are good sites for ponds. The soils can be used for crops if they are adequately drained, but many of the areas are difficult to drain. (Capability unit IVw-1; woodland suitability group 8)

Lakemont and Madalin silty clay loams, 2 to 6 percent slopes (LdB).—Soils of this unit are mostly poorly drained. They generally are along small drainageways or occupy small seeps within areas of better drained soils. Most areas consist of either the Lakemont soil or the Madalin soil. Very few are made up of both soils. Each of these soils has a profile similar to the one described as typical for its respective series.

Wetness and fine texture limit use of these soils. Most areas are in pasture or trees. Unless these soils are drained, they are too wet for cultivation. Drained areas can be used for forage crops that tolerate moderate wetness. The areas are good sites for ponds. They are poorly suited for use as housing sites or for use for recreational purposes. (Capability unit IVw-2; woodland suitability group 8)

Langford Series

In the Langford series are deep, moderately well drained, low-lime soils that have a fragipan. These soils formed in medium-textured glacial till that consisted chiefly of dark-colored shale but that also included varying amounts of sandstone and crystalline rock. They are in the northern part of the county on the sides of hills, or drumlins, that lie in an east-west direction. Slopes are mostly short and convex.

The Langford soils are near the somewhat poorly drained Erie soils, which formed in similar materials. They are also near the Burdett and Nunda soils and their associates. Langford soils are similar to Nunda soils but are coarser textured in the lower part of the subsoil and have a fragipan. They are similar to Mardin soils but are less acid.

A profile of Langford soils commonly has a plow layer of dark grayish-brown, friable channery silt loam 4 to 10 inches thick. The upper part of the subsoil is a yellowish-brown, friable channery silt loam 5 to 12 inches thick. It overlies distinctly mottled, light olive-brown, firm, leached channery loam 4 to 6 inches thick. Just below is a fragipan of mottled, dark grayish-brown to olive-brown channery silt loam that is very firm and dense and is slowly permeable. At a depth of 40 to 60 inches is equally dense, calcareous channery silt loam or loam glacial till.

Langford soils generally are deep over bedrock, but in some places near Esperance, sandstone or shale bedrock is at a moderate depth.

Early in spring the water table is perched above the fragipan at a depth of 10 to 20 inches. At this time the Langford soils are too wet to be tilled. By the middle of May, the water table is perched above the fragipan for only a few days after a rain, and except for these few days, the soils can be tilled.

The depth to which plants can obtain nutrients and water is confined mainly to the 16 to 24 inches above the fragipan. Here, the water-holding capacity is moderate. During normal rainfall, plants on these soils obtain enough moisture for good growth, but during long periods of drought, the plants are damaged by lack of moisture.

Langford soils are strongly acid. Lime is needed for most crops. The supply of nitrogen is moderately high, but early in spring the nitrogen is released too slowly for plant growth. Crops on these soils therefore need additional nitrogen and respond if nitrogen fertilizer is applied in spring. Rapidly growing crops also respond if nitrogen fertilizer is added in midsummer. The supply of available potassium and phosphorus is moderate, and most crops require additions of these nutrients for good growth.

In this county Langford soils are mapped only in undifferentiated units with Nunda soils. A profile typical for Nunda soils and the mapping units are described under the Nunda series.

Lansing Series

The Lansing series consists of deep, well-drained, medium-lime soils that formed in calcareous glacial till. These soils are in the uplands in the northeastern part of the county. Slopes are convex and gentle to moderately steep. Water does not accumulate on the areas. In most places Lansing soils dominate in an entire field.

The Lansing soils are near the moderately well drained Conesus soils and the somewhat poorly drained Appleton soil, both of which formed from materials similar to those of Lansing soils.

A profile of Lansing soils commonly has a plow layer of dark grayish-brown, friable channery silt loam 6 to 10 inches thick. Just below is a leached layer of yellowish-brown, friable channery silt loam 5 to 10 inches thick. It merges with the subsoil, a yellowish-brown, firm channery silt loam layer that contains more clay than the layers above or below. Dark-brown and light brownish-gray, very firm and dense calcareous channery loam glacial till is at a depth of 30 to 40 inches.

Depth to bedrock is more than 8 feet in most places. It is less than 8 feet in a few places, however, especially on sloping valley sides.

Lansing soils are saturated early in spring after the ground thaws. They dry out quickly, and by April the water table generally is below a depth of 20 inches except for a short time after a rain. In May the water table generally is just above the compact till and does not interfere with tillage.

The depth of soil available for plant roots is between 30 and 40 inches. To this depth the water-holding capacity is high.

In unlimed areas the Lansing soils are strongly acid to medium acid in the surface layer. The subsoil is neutral to slightly acid, and free lime occurs in the underlying material. Lime is required for good growth of crops. Total nitrogen is moderately high, but plants on these soils need additional nitrogen and respond if it is applied. The supply of available potassium and phosphorus is moderate, and these nutrients are needed for good growth of the crops commonly grown.

Lansing soils are among the better soils in the uplands of the county for crops.

Lansing channery silt loam, 2 to 10 percent slopes (LhB).—This soil has the profile described for the series. It generally dominates an entire field. Slopes are uniform and undulating, and the soil receives little runoff from adjacent soils.

Included with this soil are small areas of wetter Appleton and Conesus soils. These wetter areas are not numerous, but they may be troublesome early in spring.

This Lansing soil is suited to cultivated crops, pasture, or trees. Corn, small grains, and deep-rooted legumes commonly grown for forage are suitable crops. Runoff is medium, and the hazard of erosion is moderate. The soil can be used for housing sites and other similar nonfarm purposes. Septic tank drainage fields require special attention, however, because of the firm and dense underlying till. (Capability unit IIe–1; woodland suitability group 1)

Lansing channery silt loam, 10 to 20 percent slopes (LhC).—In this soil depth to bedrock generally is more than 8 feet, though it is 4 to 6 feet on the sides of valleys. Slopes are steep enough to cause some difficulty in use of farm machinery.

Included with this soil are small areas of a steeper soil. Also included are small areas of Appleton and Conesus soils.

This Lansing soil is suited to cultivated crops, pasture, or trees. In cultivated areas, careful management is needed because of the steep slopes and hazard of erosion. The forage crops commonly grown in the county do well on this soil. Slope is the chief limiting factor for many nonfarm uses of this soil. (Capability unit IIIe–1; woodland suitability group 1)

Lansing channery silt loam, 10 to 20 percent slopes, eroded (LhC3).—Many areas of this soil are on the sides of valleys. Much of the original surface layer has been lost through erosion. The present plow layer in about 75 percent of the acreage consists mainly of material formerly in the leached layer. This layer generally is lighter colored and less acid than the plow layer in uneroded areas, and

it contains less organic matter and available nitrogen. Depth to the more clayey subsoil material ranges from 12 to 15 inches. In some places, and especially on the sides of valleys, depth to bedrock is less than 4 feet. Included are small areas that have slopes of 20 to 25 percent.

This Lansing soil is better suited to pasture, long-term hay, or forest than to cultivated crops. Use of the soil for cultivated crops should be limited so as to minimize the continuing serious erosion hazard. Slope is the chief limiting factor for many nonfarm uses of this soil. (Capability unit IVe–2; woodland suitability group 1)

Lima Series

The Lima series consists of deep, moderately well-drained, high-lime soils formed in calcareous glacial till. These soils occur in the uplands in the northern part of the county. They are gently sloping and occupy slightly convex areas. Most areas receive runoff from higher soils.

The Lima soils are near the well-drained Honeoye and Mohawk soils and the somewhat poorly drained Appleton soils. They also are near the poorly drained Ilion soils and the poorly drained or very poorly drained Lyons soils.

A profile of Lyons soils commonly has a plow layer of dark grayish-brown, friable silt loam 6 to 12 inches thick. Just below is the upper part of the subsoil, an olive-brown, firm loam that is 2 to 4 inches thick and is slightly leached. The lower part of the subsoil is mottled, dark grayish-brown, firm silt loam that is slightly more clayey than the layers above or below. Depth to faintly mottled, light olive-brown, calcareous gravelly loam glacial till is 15 to 30 inches. The till is very firm and dense and is slowly permeable. It contains stones and pebbles that consist chiefly of limestone. In most places depth to bedrock is more than 8 feet, but in a few areas bedrock is at a depth of 3 to 8 feet.

Lima soils are saturated early in spring when the frost leaves the ground. Early in April water stands at or near the surface after a heavy rain. At this time the soils generally are too wet to be tilled. During May the soils can be tilled except for several days after a rain. By June the water table is just above the underlying firm till. Then the soils can be worked except for a day or two after a heavy rain.

Because of the dense underlying till, roots are confined to the uppermost 20 to 30 inches of soil. At this depth the water-holding capacity is moderate to high. During dry periods in midsummer, plants on these soils are damaged from lack of moisture after 7 to 10 days without rain.

Lime is not needed on most Lima soils. Total nitrogen is moderately high in these soils. It is released slowly in the wet, cold spring, and crops on these soils respond if nitrogen is added at this time. The supply of available potassium is moderately high. It is adequate for good growth of crops, but if the soils are cropped intensively, potassium fertilizer is needed for continued good growth. The supply of available phosphorus is moderate, and additional phosphorus is needed for good growth of crops.

The Lima soils are among the most productive soils in the uplands of the county. In this county Lima soils are mapped only in undifferentiated units with Mohawk soils. A profile representative of Mohawk soils and the mapping units are described under the Mohawk series.

Lordstown Series

The Lordstown series consists of moderately deep, well-drained, medium-textured soils that are nearly level to steep. These soils are widely distributed in that part of the county occupied by the higher parts of the Allegheny Plateau. They developed in thin deposits of glacial till that contained much gray sandstone, siltstone, or shale. Depth to bedrock ranges from 20 to 40 inches. Because the sandstone and shale are layered, some areas of Lordstown soil have a "stairsteps" landscape with steep rocky cliffs separating the steps.

The Lordstown soils occur mainly with the shallow Arnot and Nassau soils, the deep Mardin soils, and the wetter Tuller and Volusia soils.

A profile of Lordstown soils commonly has a brown to dark-brown, very friable channery silt loam plow layer 6 to 9 inches thick. Just below is yellowish-brown, friable channery silt loam about 10 to 20 inches thick. The next layer, which does not occur in all places, is mottled, light olive-brown, firm channery loam less than 8 inches thick. Sandstone or shale bedrock is at a depth of 20 to 40 inches.

Water moves readily downward through these soils, but early in spring a water table may be perched above the bedrock, especially in areas where the bedrock is below a depth of 30 inches. The water-holding capacity of these soils varies according to their thickness. The more shallow areas have a lower water-holding capacity, and plant growth is limited during dry summers. Root penetration is good above the bedrock.

The Lordstown soils are medium acid to strongly acid, and liming is one of the more important concerns of management. The supply of available nitrogen, phosphorus, and potassium is moderate. Crops respond well to added nitrogen, and potassium fertilizer must be added to maintain good growth of crops where these soils are cropped heavily. In some places these soils contain stones and rock fragments in numbers that make tillage impractical. Before these stony soils can be used for crops, the stones must be removed.

Since 1900, much of the acreage of Lordstown soils has been reforested. Trees have been planted on a large acreage, and in other areas hardwoods have been allowed to grow back. The acreage still farmed is used mostly for hay and pasture.

Lordstown channery silt loam, 0 to 5 percent slopes (LmA).—This is one of the better Lordstown soils for farming. It occupies terracelike benches and hilltops. Included are small areas of the Arnot, Mardin, and Volusia soils.

This Lordstown soil is suited to many kinds of crops. It can also be used for pasture or as woodland. Some rock fragments are in the plow layer, but not enough to hinder tillage much. Because bedrock is so near the surface, the use of this soil is limited for many nonfarm purposes. This soil is not suitable as a site for farm ponds. Water penetrates this soil readily, and in the more sloping areas the hazard of erosion is slight. (Capability unit IIs–1; woodland suitability group 3)

Lordstown channery silt loam, 5 to 15 percent slopes (LmC).—This soil is moderately deep and is well drained. It occurs on the sloping sides of valleys and on gently rolling hilltops.

Included with this soil are small areas of Chippewa soils around seeps and small areas of the Arnot, Mardin, and Volusia soils.

This Lordstown soil is suited to many kinds of crops. It can also be used for pasture or woodland. Some stones and rock fragments are in the plow layer, but tillage is feasible. The use of farm machinery is more difficult on this soil than on the less sloping Lordstown soils. In most places the slopes are uniform, however, and this soil can be farmed on the contour. Shallowness to bedrock limits the use of this soil for farm ponds and residential sites.

Water penetrates this soil readily. Where the soil is left bare or is in row crops, erosion is a hazard. The water-holding capacity generally is moderate to high, but in the more shallow areas it is low and limits plant growth in dry years. (Capability unit IIIe-3; woodland suitability group 3).

Lordstown channery silt loam, 15 to 25 percent slopes (LmD).—This soil is moderately deep and is well drained. It occurs mainly on the sides of valleys.

Included with this soil are small areas of Chippewa soils around seeps and in depressions. Also included are small areas of Arnot, Mardin, and Volusia soils.

This Lordstown soil can be used for cultivated crops, but only with difficulty, because slopes are so steep that the use of modern farm machinery is difficult and hazardous. Also, the hazard of erosion is severe. Better uses are hay grown for long periods, permanent pasture, or trees. (Capability unit IVe-3; woodland suitability group 3)

Lordstown channery silt loam, 25 to 35 percent slopes (LmE).—This soil is well drained and is moderately deep. It occurs mainly on the steep sides of valleys in the southern part of the county. Depth to bedrock varies within short distances, and in many areas rock crops out as steep cliffs.

Small areas of the Arnot, Nassau, Mardin, and Volusia soils are included with this soil. Also included are small areas of Chippewa soils around seeps.

This Lordstown soil is suitable for use as pasture or woodland. Tall grass can be used for pasture, but the use of farm machinery on this steep soil is difficult and hazardous. Growth of pasture plants is poor unless the soil is limed and fertilized. Because rainwater runs off rapidly and shallow areas store little water, pasture plants are damaged by drought during most summers. (Capability unit VIIe-1; woodland suitability group 4)

Lordstown silt loam, 0 to 8 percent slopes (LnB).—This is one of the better Lordstown soils for farming. It overlies shale bedrock but is nearly free of rock fragments. It occupies terracelike benches and hilltops. Small areas of Nassau, Allis, and Chippewa soils are included with this soil.

This Lordstown soil is suited to cultivated crops, pasture, and trees. Where it is adequately limed and fertilized, most forage crops grow well. The moisture-holding capacity of this soil is more favorable than that of other Lordstown soils. Roots, air, and water penetrate between layers of the underlying shale. The use of this soil is limited for many nonfarm purposes by shallowness to bedrock. Water penetrates this soil readily above the bedrock, and in the more sloping areas the hazard of erosion is moderate. (Capability unit IIe-3; woodland suitability group 3)

Lordstown and Oquaga very stony soils, 0 to 35 percent slopes (LoE).—The soils in this group are shallow to moderately deep, well drained, and very stony. Depth to bedrock ranges from 12 to 40 inches. Except for stoniness and rockiness, the soils in this group have a profile similar to the one described for their respective series. Some areas are made up of only the Lordstown or Oquaga soil. Other areas are made up of both of these soils.

Included with these soils are fairly large areas of Arnot soils that are very stony and rocky. Also included are small areas of Chippewa soils around seeps and in depressions.

The soils in this group have so many stones on the surface that the use of modern farm machinery is impossible. They are too stony for cultivated crops, but they have limited use as unimproved pasture. A better use is for trees. (Capability unit VIIs-1; woodland suitability group 9)

Lordstown, Oquaga and Nassau soils, 35 to 70 percent slopes (LrF).—The soils in this group are steep to very steep, shallow to moderately deep, and well drained. In many places they contain many stones and rock fragments. These soils have profiles similar to the ones described for their respective series. Some mapped areas contain only one soil of this group, some areas contain two soils, and some contain all three soils. In many places outcrops of bedrock form steep cliffs that have much stony rubble at their base.

Included with this group are small areas of Chippewa soils around seeps and a few areas of the shallow Arnot and the deep Mardin soils.

Because they are too steep and, in many places too stony or rocky, the soils in this group are not suited to farming. Some practical uses are as woodland, wildlife habitat, and for some kinds of recreation. (Capability unit VIIs-1; woodland suitability group 4)

Lyons Series

In the Lyons series are deep, poorly drained or very poorly drained, high-lime soils that formed in calcareous glacial till. These soils are mostly nearly level to depressional, but they are steep in a few small seeps. They are in the uplands of the low plateau area in the northern part of the county.

The Lyons soils are near the Darien, Honeoye, Lansing, and Mohawk soils and their associates.

A profile of Lyons soils commonly has a surface layer of very dark brown to black, friable silt loam that is 5 to 10 inches thick and has a high content of organic matter. The subsoil is mottled, gray or light brownish-gray, firm silt loam or fine sandy loam that grades to gravelly silt loam in the lower part. Depth to glacial till ranges from 18 to 32 inches. The till is firm and dense, light brownish-gray, highly calcareous gravelly silt loam.

In most places these soils have a layer of silt loam that was deposited by water above the till. The thickness of this deposit varies from place to place. As a result, the surface layer contains only a few coarse fragments in some places and is very stony in other places. The soils near the Honeoye and their associates generally contain more lime than those near the Lansing soils and their associates.

The water table is at or near the surface of Lyons soils early in spring. It recedes in May between rains. In the

driest areas the water table may fall to a depth of 20 inches during dry periods, but in most places it is at a depth of less than 10 inches. These soils are too wet in June to bear farm machinery. They dry out only in dry summers. In most summers, however, these soils are wet throughout the growing season and may be saturated to the surface after a heavy rain.

The surface layer of these soils is medium acid to neutral in most areas, and little lime is required. Although nitrogen occurs in large amounts in these soils, it is released slowly to plants and symptoms of nitrogen deficiency are common. The reserve of potassium in the mineral part of the soil is moderate, but the available potassium held in the organic matter is greater than that in the plow layer of associated, better drained soils. Nevertheless, potassium fertilizer is needed if the soils are drained and are cropped intensively. The supply of available phosphorus is moderate.

Wetness is the major limitation for many farm and nonfarm uses of Lyons soils.

In addition to the descriptions of mapping units that contain Lyons soils that follow, other mapping units containing Lyons soils are discussed under the Ilion series.

Lyons silt loam, shallow, 0 to 8 percent slopes (LsB).—This soil occupies nearly level to slightly depressional areas. It is shallow to limestone bedrock, but its profile otherwise is similar to the one described for the series. Depth to bedrock generally is 10 to 20 inches, but in places it is as much as 40 inches. Included are many small areas of shallow Farmington soils.

This Lyons soil is suited to pasture or trees. Unless this soil is drained, only plants that tolerate wetness do well. Most of the areas are difficult to drain because the soil is shallow over bedrock. Wetness prevents use of farm machinery early in spring, late in fall, and in summer after a heavy rain. Use of the soil for community developments or for recreational purposes is limited by wetness and shallowness to bedrock. (Capability unit IVw–3; woodland suitability group 8)

Lyons and Ilion very stony soils, 0 to 8 percent slopes (LyB).—The soils in this group are in natural drainageways, in small depressions, and in small seeps on the sides of hills. Some areas consist of the Lyons soil, other consists of the Ilion soil, and a few are made up of both soils. Individual areas range from 5 to 10 acres in size. These soils are wet and are very stony. In many places, and especially in wooded areas, the surface layer is thin and mucky.

Included with these soils are a few small areas of better drained soils on knolls. Also included are a few small areas of muck that are free of stones.

These Lyons and Ilion soils are in unimproved pasture, have a cover of trees, or are idle. They are too stony and wet for cultivated crops but are suitable for pasture or trees. The areas provide limited grazing in summer and in fall. The only trees that grow well on these soils are ones that tolerate wetness. The areas generally are good sites for ponds. (Capability unit VIIs–2; woodland suitability group 8)

Madalin Series

The Madalin series consists of deep, high-lime soils that are poorly drained or very poorly drained. These soils formed in gray, calcareous, glaciolacustrine silt and clay. They occupy flat or slightly depressional areas in basins that formerly were occupied by glacial lakes. Some areas are large, but many are small and are within larger areas of better drained soils. Other areas are narrow and are along natural drainageways.

The Madalin soils are surrounded mainly by soils of the Hudson and Rhinebeck series. They also are near the Tioga soils on bottom lands and associates of Tioga soils.

A profile of Madalin soils commonly has a plow layer of very dark gray, friable silty clay loam 4 to 8 inches thick. The upper part of the subsoil is prominently mottled, dark grayish-brown, firm silty clay 5 to 15 inches thick. The lower part of the subsoil is mottled, gray, firm silty clay. It merges with a substratum of gray, firm, calcareous silty clay or clay at a depth of 20 to 30 inches.

In the poorly drained areas, the surface layer generally is silty clay loam, but it ranges from silt loam to silty clay. In the very poorly drained areas, the surface layer is thin and mucky. Covering some areas is a thin deposit of fine sand or of silty material that washed from adjacent higher lying soils.

The subsoil is mainly silty clay, but in places it is clay. It contains very little sand. Depth to carbonates ranges from 18 to 36 inches.

Free water is at or near the surface of these soils early in spring. Plowing seldom can be done in April or early in May. In May 5 to 10 drying days are needed in the less wet areas before the soils can be worked. The wettest areas can be plowed only in dry years.

In undrained areas of Madalin soils, plant roots are confined to the uppermost 8 to 10 inches of soil. Roots of some plants that tolerate wetness, however, send their roots into the subsoil. In drained areas plant roots penetrate to a depth of 15 to 20 inches.

The Madalin soils contain large amounts of lime. The content of organic matter in the surface layer is high. The supply of nitrogen is very high, but it is released slowly and is not readily available to plants. Available potassium is high, and available phosphorus is moderate.

Wetness limits use of the Madalin soils. Many small areas that are associated with drier soils can be improved by drainage.

In this county most of the acreage of Madalin soils is mapped in undifferentiated groups with Lakemont soils. These mapping units are described under the Lakemont series.

Madalin silt loam, over till (Ma).—This soil is 24 to 40 inches deep over glacial till, but its profile otherwise is like the one described for the series. It is level or nearly level and occupies closed depressions, mainly in small basins within larger areas of better drained soils. The areas of this Madalin soil generally are small and wet. Many of them are in long, narrow drainageways between drumlin-like hills. Many areas have a thin cover of silt and clay that was washed from adjacent higher lying soils. In wooded areas the surface layer is thin and mucky.

Included with this soil are small areas of better drained Darien, Honeoye, and Mohawk soils and some small mucky areas. The included areas make up less than 5 percent of any one area.

Madalin silt loam, over till, is mostly idle, is wooded, or is used as unimproved pasture. Undrained areas are better suited as pasture, woodland, and wildlife areas than as cropland. Plants that tolerate wetness are the only ones

that grow well in undrained areas. Corn, small grains, and hay can be grown in drained areas. This soil is too wet for most kinds of buildings and for most recreational uses. (Capability unit IVw–1; woodland suitability group 8)

Mardin Series

The Mardin series consists of deep, moderately well drained or well drained, very low-lime soils that have a dense, slowly permeable fragipan. These soils formed in olive-brown glacial till that was derived mainly from acid sandstone and shale. They are in the uplands in the southern part of the county and have gentle to steep slopes.

The Mardin soils occur mainly with the somewhat poorly drained Volusia soils, but they occupy slightly higher areas than those soils. Also nearby are the wet Chippewa soils in level to depressional areas. Mardin soils are also near the shallow Arnot soils and the moderately deep Lordstown soils.

A profile of Mardin soils commonly has a plow layer of dark-brown, friable channery silt loam 3 to 6 inches thick. The upper part of the subsoil is yellowish-brown, friable channery silt loam 9 to 20 inches thick. It overlies mottled, grayish-brown to light olive-brown, firm, leached channery silt loam that is 1 to 4 inches thick. Just below is a slowly permeable fragipan that consists of extremely firm and very dense, faintly mottled, olive-brown channery silt loam. An equally dense layer of olive-brown, very channery silt loam glacial till is at a depth of 48 to 60 inches.

Early in spring the water table is perched above the fragipan at a depth between 15 and 24 inches. By the middle of May the water table stands above the fragipan for only a few days after a rain. The soils dry out fairly rapidly in spring and can be tilled in May or June except for a few days after a rain.

Plants on Mardin soils generally obtain nutrients and water from the 15 to 30 inches above the fragipan, and in this part of these soils the water-holding capacity is moderate to high.

Unlimed areas of these soils are strongly acid. Lime is needed for growth of the common crops. Crops that grow rapidly respond if nitrogen fertilizer is applied. The supply of available potassium and phosphorus is moderate, and fertilizer that contains these nutrients is needed for good growth of crops.

Mardin channery silt loam, 2 to 8 percent slopes (McB).—This soil is similar to, but is usually wetter than, other Mardin soils. Depth to the fragipan is commonly less than in the profile described as typical for Mardin soils, and the well-aerated, yellowish-brown layer is thinner. The gentle slopes make this soil more favorable for tillage than more sloping Mardin soils.

Included with this soil are small areas of somewhat poorly drained Volusia soil. Also included are small areas of well-drained Lordstown soils that are moderately deep to bedrock. Other included areas consist of wet Chippewa soils in small depressions and in seep spots.

This Mardin soil is suited to cultivated crops, pasture, and trees. It is well suited or fairly well suited to selected varieties of corn and alfalfa, as well as to timothy and trefoil. Erosion is a moderate hazard. Water control is a minor problem in areas used for housing developments and for recreational purposes. (Capability unit IIe–6; woodland suitability group 3)

Mardin channery silt loam, 8 to 15 percent slopes (McC).—This soil has the profile described as typical for the series. Slopes generally are long and smooth, though some areas are hilly and are cut in places by shallow drainageways.

Included with this soil are small wet areas of Chippewa soils. Also included are many small areas of wetter Volusia soils.

This Mardin soil is suited to cultivated crops, pasture, or trees. The areas are used mostly for forage crops for dairy cattle. The erosion hazard is severe. Seasonal wetness and depth to the fragipan are the main factors to consider in using these soils for many nonfarm purposes. (Capability unit IIIe–6; woodland suitability group 3)

Mardin channery silt loam, 8 to 15 percent slopes, eroded (McC3).—Much of the original surface layer of these soil has been lost through erosion. The present plow layer consists mostly of material formerly in the subsoil. It generally is lighter colored and contains less organic matter than that in the profile described for the series. Also, water penetrates this soil more slowly, runoff is greater, and the soil holds less water for plants. Depth to the fragipan is less than in uneroded Mardin soils.

Small areas that are uneroded or that are very severely eroded are included. Also included are small areas of Chippewa and Volusia soils.

This Mardin soil can be used for cultivated crops, but it generally is better suited to hay grown for a long time or to pasture or to trees. If this soil is cultivated, runoff and erosion must be controlled. (Capability unit IVe–4; woodland suitability group 7)

Mardin channery silt loam, 15 to 25 percent slopes (McD).—This soil is at the base of rocky cliffs or is on the sides of hills. Many areas are well drained and lack the mottles of the profile described as typical for the Mardin series. Much water runs off this steep soil, and in summer plants are damaged from lack of water even in short dry periods. Erosion is a severe hazard.

Included with this soil are small areas of wetter Volusia soils. Also included are small wet areas of Chippewa soils in depressions and in seeps.

Steep slopes limit use of this soil. The soil can be used for cultivated crops, but the slopes make use of farm machinery difficult. Cropping systems that include sod-forming crops for much of the time generally are more suitable. The slopes are also a major limitation for many nonfarm uses of this soil. (Capability unit IVe–3; woodland suitability group 3)

Mardin channery silt loam, 25 to 35 percent slopes (McE).—This soil is on the sides of valleys or occupies short slopes on the plateau. It is among the better drained Mardin soils and is not mottled. Most cleared areas are moderately eroded or are severely eroded. Little or no erosion has occurred in areas that are still wooded.

Included with this soil are many small areas of a soil that is similar to Mardin soils but is more poorly drained. Also included are small areas of somewhat poorly drained, less steep Volusia soils.

Steep slopes make it difficult and hazardous to use modern farm machinery on this Mardin soil. The areas are better used for pasture and trees. Pasture improvement is difficult, however, because of the steep slopes. Some areas

are suitable for use as ski slopes, but limitations to use for many other nonfarm purposes are moderate to severe. (Capability unit VIe–1; woodland suitability group 4)

Mardin and Cattaraugus soils, 35 to 70 percent slopes (MdF).—These soils are less than 24 inches deep over the fragipan in places, but otherwise each soil has a profile similar to the one described as typical for its respective series. In most places large numbers of stones are on the surface. The areas generally consist wholly of Mardin soil or of Cattaraugus soil. Very few of them are made up of both soils. Some areas are overgrazed and are moderately eroded to severely eroded, but others are uneroded or only slightly eroded.

Included with these soils are small areas of Chippewa, Culvers, and Volusia soils. Also included are small areas of Morris and Norwich soils.

These Mardin and Cattaraugus soils are not suitable for farming, because they are very steep and, in most places, are very stony. They are better used as woodland and for recreational purposes. (Capability unit VIIe–1; woodland suitability group 4)

Mardin and Culvers very stony soils, 0 to 35 percent slopes (MeE).—The soils in this group are nearly level to very steep, strongly acid, well drained or moderately well drained. Except for stoniness, each of these soils has a profile similar to the one described as typical for its respective series. Most areas are made up of only one of these soils, the Mardin or the Culvers. Very few areas consist of both soils.

Included with these soils are fairly large areas of very strong Cattaraugus soils and very stony Langford soils. Also included are small areas of wetter Chippewa, Morris, and Volusia soils and smaller areas of very stony Schoharie and Tunkhannock soils.

The soils in this group have so many stones on the surface that the use of farm machinery is impossible in most places and impractical in others. These soils are too stony for cultivated crops, but some areas have limited use as unimproved pasture. Better uses are for trees and for wildlife habitat. Limitations for nonfarm purposes vary. (Capability unit VIIs–2; woodland suitability group 3)

Middlebury Series

The Middlebury series consists of deep, moderately well drained, medium-textured soils. These soils occur on first bottoms and are nearly level. They formed in recently deposited gray alluvium that washed mainly from soils on gray standstone and shale.

The Middlebury soils are adjacent to the well-drained Tioga soils, the somewhat poorly drained or poorly drained Holly and Wayland soils, and the very poorly drained Papakating soils. They also are near Chenango soils and their associates. Other nearby soils of the uplands are chiefly those of the Darien, Honeoye, Mardin, and Mohawk series and their associates. Middlebury soils are similar to the Basher soils, which formed in recently deposited reddish alluvium.

A profile of Middlebury soils commonly has a plow layer of dark-brown, friable silt loam 4 to 10 inches thick. The upper part of the underlying material consists of dark yellowish-brown, friable silt loam and is 6 to 24 inches thick. It may be mottled in the lower part. The lower part of the subsoil is mottled, dark grayish-brown, friable gravelly loam or silt loam that is 4 to 6 inches thick. It overlies mottled, olive-gray or gray, friable to loose material that consists mostly of layers of sand, silt, and gravel.

The surface layer is gravely in a few places. The underlying material ranges from silt loam to very gravelly sandy loam in texture. Mottling caused by waterlogging commonly is at a depth of 15 to 24 inches. The soils are strongly acid to slightly acid in the upper part and in places are calcareous at a depth of 3½ to 6 feet.

Middlebury soils are flooded in many places early in spring. In April the water table is just below the surface, and wetness prevents tillage during most of the month. By May the water table has dropped significantly, and the soils then can be tilled except for a few days after a heavy rain.

Roots grow mostly in the upper 24 to 36 inches of these soils. The water-holding capacity of the soils is moderate to high. Middlebury soils are less droughty than many soils in the county, mainly because of the relatively high water table.

The Middlebury soils have a moderate content of organic matter in the surface layer. Their supply of nitrogen is moderately high, but this element is released to plants slowly and additional nitrogen is needed for good crop growth. The supply of available potassium and phosphorus is moderate.

These soils are among the most productive in the county, but the choice of suitable crops is limited by wetness. Flooding in spring limits use of these soils for many nonfarm purposes.

In this county Middlebury soils are mapped only in undifferentiated groups with Basher soils. A profile typical of Basher soils, and mapping units containing Middlebury soils, are described under the Basher series.

Mohawk Series

In the Mohawk series are deep, well drained to moderately well drained, high-lime soils that are gently sloping to steep. These soils are in the uplands of the low plateau in the northern part of the county. They receive little runoff from adjacent higher lying soils. Mohawk soils formed in calcareous glacial till that was derived mainly from black shale containing a large amount of lime. They have good structure.

The Mohawk soils are near the Honeoye and Lima soils. They are adjacent to wetter Appleton and Ilion soils.

A profile of Mohawk soils commonly has a plow layer of very dark grayish-brown, friable silt loam 4 to 10 inches thick. The upper part of the subsoil consists of dark grayish-brown, friable silt loam and is 7 to 21 inches thick. The lower part of the subsoil is dark grayish-brown, firm silty clay loam that may be mottled at a depth below 20 inches. At a depth of 24 to 48 inches is dense and firm, very dark grayish-brown very cobbly or shaly silt loam glacial till. The till is calcareous. Bedrock generally is at a depth of more than 10 feet, but it is only 3½ feet from the surface in places.

Mohawk soils are mostly well drained, and they dry out and warm up quickly early in spring. At this time they can bear farm machinery except for a few days after a rain.

Movement of water and penetration of roots are restricted by the dense, firm glacial till that underlies these

soils. In most places the rooting is confined to a depth of 30 to 36 inches, and to this depth the water-holding capacity is high. In midsummer moisture generally is sufficient to sustain plant growth for 7 to 10 days without rain.

In some places enough gravel and larger fragments occur in Mohawk soils to interfere with tillage, and in a few places stones are so numerous that they prevent tillage.

Mohawk soils are among the most productive in the county. Most areas require only a little lime, and some areas do not need any. The supply of nitrogen is moderate, and most plants respond if nitrogen fertilizer is added early in spring. The supply of potassium is higher than in many other soils in the uplands of the county, but additional potassium is needed for continued good growth of crops. Available phosphorus is moderate, and this nutrient must also be added for good crop growth.

In this county Mohawk soils are mapped only in undifferentiated groups with Honeoye, Lansing, or Lima soils.

Mohawk and Honeoye silt loams, 10 to 20 percent slopes (MhC).—The soils in this group are on the sides of valleys and in dissected areas where streams have cut into the glacial till. Each of these soils has a profile similar to the one described as typical for its respective series. Some areas consist wholly of the Mohawk soil, others are made up wholly of the Honeoye soil, and still others are made up of both soils. Runoff is moderate to rapid, and little water is received from adjacent higher areas. Most areas are small and are within areas of more gently sloping Lima or Mohawk soils.

These soils are steep enough to make the use of farm machinery moderately difficult, but they can be cropped. Most crops grown in the county are well suited. Also suited are pasture and trees. Control of runoff and erosion is needed. (Capability unit IIIe–1; woodland suitability group 1)

Mohawk and Honeoye silt loams, 10 to 20 percent slopes, eroded (MhC3).—These soils generally are on the sides of valleys and in dissected areas where small streams have cut into the glacial till. Some areas consist only of the Mohawk soil or of the Honeoye soil; other areas are made up of both soils. Each of these soils has a profile that differs from the one described as typical for its respective series in that the original surface layer has been lost through erosion in many places. In many of these places the plow layer includes all of the material formerly in the upper part of the subsoil, and in some it even includes some of the more clayey lower part. The plow layer of these eroded soils contains more coarse fragments than that in uneroded Mohawk and Honeoye soils. It also contains less organic matter, and therefore less nitrogen is available. Because these soils absorb water more slowly than uneroded Mohawk and Honeoye soils, runoff is greater and less water is available for plants in the thinner profile.

Included with these soils are small areas that have a cover of depositional material.

These Mohawk and Honeoye soils are suited to cultivated crops, pasture, and trees. Because of past erosion, however, alfalfa and other deep-rooted legumes should be favored in cropping systems. Other crops grow well under good management, but they are likely to be damaged by drought more quickly than crops on uneroded soils. Slope is the main limitation for many nonfarm uses. (Capability unit IVe–2; woodland suitability group 1)

Mohawk and Honeoye silt loams, 20 to 30 percent slopes (MhD).—The soils in this group are on the sides of valleys and hills. They are well-drained, slightly acid soils that have good fertility. As much as 25 percent of the original surface layer has been lost through erosion in 25 to 30 percent of the acreage. Erosion is severe in some included areas. Some areas consist only of the Mohawk soil or of the Honeoye soil; other areas are made up of both soils. Each of these soils has a profile similar to the one described as typical for its respective series.

Included with these soils are some steep Lansing soils, which are similar to Honeoye soils but are more acid. Also included are small areas of Appleton, Ilion, and Lyons soils in depressions and in seeps.

The soils in this group can be used for crops, pasture, or trees. Because these soils are too steep to cultivate safely with modern farm machinery, a cropping system is needed that includes sod-forming crops for much of the time. (Capability unit IVe–1; woodland suitability group 1)

Mohawk and Honeoye soils, 30 to 50 percent slopes (MhF).—The soils in this group have a thinner, less clayey subsoil than that in the profile described for the Mohawk or Honeoye series. In about 15 to 25 percent of the acreage, most of the original surface layer has been lost through erosion and gullies are common. In some places the soils are very stony. Some areas are made up only of Mohawk soils or of Honeoye soils; other areas are made up of both soils. Erosion ranges from none to severe.

Included with these soils are areas of very steep Lansing soils, which are similar to Honeoye soils but are more acid. Also included are small areas of Appleton, Ilion, and Lyons soils.

Much of the acreage of these Mohawk and Honeoye soils has never been cleared and is not eroded. The soils are too steep for cultivation. They are better suited to trees or for use as recreational areas. (Capability unit VIIe–1; woodland suitability group 1)

Mohawk and Lansing very stony silt loams, 3 to 20 percent slopes (MkC).—The soils in this group are well drained to moderately well drained. They contain moderate to large amounts of lime.

Included with these soils are small areas of Ilion, Lyons, and Madalin soils in seeps and in wet places along small waterways. Other included areas consist of very stony Conesus, Honeoye, and Lima soils.

These Mohawk and Lansing soils are suited to pasture and to trees. The stones on the surface must be removed before the soils can be cultivated. (Capability unit VIs—2; woodland suitability group 1)

Mohawk and Lansing very stony silt loams, 20 to 30 percent slopes (MkD).—Soils in this unit occupy long slopes on the sides of hills. Runoff is rapid on these steep soils, and the soils are more droughty than less steep Mohawk and Lansing soils. Some areas are made up only of the Mohawk soil or of the Lansing soil; other areas are made up of both soils. Except that these soils are very stony, each of them has a profile that is somewhat similar to the one described as typical for its respective series.

Included with these soils are small steep areas of the similar very stony Honeoye soils. Other small included areas consist of moderately well drained Conesus and

Lima soils and of wetter Appleton, Ilion, and Lyons soils in seeps.

These Mohawk and Lansing soils are suited to pasture and trees. The stones on the surface must be removed before these soils can be cultivated. Also, the steep slopes make use of farm machinery difficult and hazardous. (Capability unit VIs–2; woodland suitability group 1)

Mohawk and Lima silt loams, 2 to 10 percent slopes (MlB).—The soils in this group are moderately well drained. They occupy large, slightly convex areas and dominate an entire field. Slopes are mostly 3 to 8 percent. Each soil in this group has a profile similar to the one described as typical for its respective series. Some areas are made up only of the Mohawk soil or of the Lima soil, and others are made up of both soils. Included are small wet areas of Ilion and Lyons soils.

These Mohawk and Lima soils are well suited to cultivated crops, and most areas are cropped. They also are well suited to pasture and trees. Corn, small grains, and hay are most commonly grown. Erosion must be controlled in the steeper areas, and excess water must be removed from the wetter areas. (Capability unit IIe–4; woodland suitability group 1)

Mohawk and Lima silt loams, 2 to 10 percent slopes, eroded (MlB3).—The soils in this group are moderately well drained. They occupy areas on the sides of valleys and on the tops of hills on rolling plateaus. Some of the areas consist only of the Mohawk soil or of the Lima soil, and other areas are made up of both soils.

In most places much of the original surface layer of these soils has been lost through erosion. The present surface layer consists mostly of material formerly in the upper part of the subsoil. It generally rests directly on the more clayey lower part of the subsoil. The present surface layer is more gravelly than the one in uneroded areas; it contains less organic matter and less nitrogen, absorbs water more slowly, and has lower water-holding capacity. Also, runoff is more rapid, and the hazard of further erosion is greater. In any single area from 10 to 25 percent of the area is uneroded, and on some of the areas there are deposits of material that washed from eroded areas. In some places, all of the soil has been washed away and calcareous till is at the surface.

Soils of this unit have slightly more available potassium and phosphorus than uneroded Mohawk and Lima soils. The supply of available nitrogen is lower, and additional nitrogen is needed for plant growth. Under good management growth of crops on these soils is moderate. In summer crops are more likely to be damaged by lack of moisture than are those on uneroded soils.

These soils are suited to cultivated crops, pasture, and trees. They are better suited, however, to sod-forming crops grown for a long time than to row crops. Alfalfa and similar deep-rooted crops are well suited. (Capability unit IIIe–4; woodland suitability group 1)

Morris Series

The Morris series consists of deep, somewhat poorly drained, medium-textured soils on the Allegheny Plateau in the southeastern part of the county. These soils are gently sloping to strongly sloping. They formed in firm, acid glacial till that was derived mainly from red sandstone, siltstone, and some red shale. A dense fragipan that restricts water and root penetration is at a depth of 12 to 18 inches. These soils either have slow runoff or receive runoff from adjacent higher areas.

The Morris soils are near or are closely intermingled with the moderately well drained Culvers soils and the well drained Cattaraugus soils. Also nearby are the wetter Norwich soils.

A profile of Morris soils commonly has a plow layer of brown to dark-brown, very friable stony silt loam 4 to 10 inches thick. The upper part of the subsoil is faintly mottled, reddish-brown, friable silt loam 4 to 8 inches thick. It is underlain by a distinctly mottled, light reddish-brown, leached layer of slightly firm channery loam 2 to 5 inches thick. The lower part of the subsoil begins at a depth of 12 to 18 inches and extends to a depth of 3 to 5 feet. It is a very firm, dense fragipan consisting of reddish-brown channery loam. It gradually merges with the glacial till substratum, which is dense, dark reddish-brown channery loam.

Early in spring the Morris soils are saturated with water within a few inches of the surface. They are wet and cold early in spring, but by June they dry enough for tilling, except during a few days after rains. In summer during dry periods not enough water is available and plant growth is restricted, because roots take in water only from the soil above the fragipan. The moisture-holding capacity is low.

The Morris soils are strongly acid, and lime is needed for good growth of crops. Phosphorus and potassium are available only in moderate amounts.

Morris stony silt loam, 2 to 8 percent slopes (MoB).—This soil has the profile described as typical for the Morris series. Slopes are long, smooth, and slightly concave. Some runoff occurs. Many areas of this soil make up an entire field. In many places this soil is adjacent to higher Culvers soils and receives runoff from them. In other places it is near the Oquaga soils.

Included with this soil on slightly convex knolls are areas of Culvers and Cattaraugus soils. In areas of small seeps and wet depressions are Norwich soils.

This Morris soil is suited to cultivated crops, pasture, or trees. Growth of such crops as corn, small grains, and hay is often poor because this soil is wet and cold early in spring. Surface stones hinder but do not prevent cultivation. Acidity and the moderate amount of available plant nutrients are the main limitations to plant growth. (Capability unit IIIw–4; woodland suitability group 7)

Morris stony silt loam, 8 to 15 percent slopes (MoC).—This is one of the drier Morris soils in the county. Runoff is rapid, but additional water generally is received from adjacent higher soils, either as runoff or seepage. This soil is near the Oquaga, Cattaraugus, and Culvers soils.

Included with this soil in mapping are small areas of Norwich soils that occur mainly as seep spots. Also included in the steeper areas are small areas of Culvers soils.

This Morris soil can be used for crops, pasture, or trees. The hazard of erosion is the main limitation to use, but periods of seasonal wetness and drought also occur. Seep spots, small water channels, and moderately steep slopes interfere with cultivation in places. Stones on the surface hinder cultivation but do not prevent it. Water control is needed where this soil is used as building sites or for recreation. (Capability unit IIIe–11; woodland suitability group 7)

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Muck, Slightly Acid

Muck, slightly acid (0 to 2 percent slopes) (Ms) is a deep, very poorly drained organic soil in small basins of the uplands in the northern part of the county. It formed in deposits of mixed woody material and sedges. In places the muck overlies marl at a depth of 2 to 4 feet. It is near the Ilion and Lyons soils, which formed in glacial till, and also near the Madalin soils, which formed in lake-laid silt and clay. Small areas of these soils are included in mapped areas, especially at the edge of bogs.

Muck, slightly acid, is made up of layers of organic material of varying thickness and origin. In most places these layers are 2 inches of black, fibrous peat moss; 6 or 7 inches of black to very dark brown, neutral muck; 8 to 12 inches of black, neutral peat; 20 to 24 inches of fibrous peat containing logs; 4 to 6 inches of black to very dark brown, calcareous distintegrated peat; and 7 to 10 inches of dark-gray sedimentary peat over dark-gray silt. The silt occurs at a depth of 55 to 60 inches. These layers vary in thickness, kind of material, and sequence in the profile. Generally, the underlying sand, silt, clay, glacial till, or bedrock is at a depth of more than 18 inches. The organic material ranges from 18 to more than 72 inches in thickness. The sedimentary peat is impermeable to water after it dries. Water perched on this layer causes serious problems of drainage.

Muck, slightly acid, is very poorly drained, and water is at or near the surface throughout the year. During dry summers the soil dries to a depth of 10 to 12 inches, but even in extremely dry summers the water table is within 30 inches of the surface.

In Schoharie County, Muck, slightly acid, is used mostly for trees. A few areas are used for unimproved pasture. If outlets are suitable, this soil can be drained and used for crops. Undrained areas are better suited as habitat for wetland wildlife or to elm, ash, soft maple, tamarack, hemlock, and other trees that tolerate wetness. This soil is high in total nitrogen, but it is low in phosphorus and potassium. Where it is drained and farmed, crops respond well to fertilizer that is high in phosphate and potash. Wetness is the main concern of management. This soil is too wet for most nonfarm uses. (Capability unit VIIw-1; woodland suitability group not assigned)

Muck and Peat, Strongly Acid

Muck and Peat, strongly acid (0 to 2 percent slopes) (Mu) consists of either acid muck, acid peat, or a mixture of both. This organic material is deep, is mainly strongly acid, and occurs in the high plateau area in the southern part of the county. It formed in organic material that was derived mainly from trees, grasses, and sedges. In most places it is more than 40 inches deep to underlying material or to bedrock, but in a few places bedrock is less than 20 inches from the surface.

Muck and Peat, strongly acid, contains layers of acid woody peat, disintegrated peat, and peat from sphagnum moss. These layers vary in thickness and in content of organic and mineral matter. Where this material is only moderately deep, it generally is higher in mineral content. Some layers contain pieces of identifiable bark and logs. The areas that are mainly of peat from sphagnum moss generally are very strongly acid and are low in all plant nutrients. Areas of woody peat, muck, and areas of muck and peat that were derived from grasses and sedges are high in total nitrogen but are low in phosphorus and potassium.

Most areas of Muck and Peat, strongly acid, are very wet and have a water table that is at or near the surface throughout the year. These areas are commonly ponded in spring, late in fall, and in winter. Wetness is the main concern of management. (Capability unit VIIw-1; woodland suitability group not assigned)

Nassau Series

The Nassau series consists of shallow, well-drained, medium-textured soils that are gently sloping to steep. These soils, though not extensive, are widely distributed throughout the uplands of the county. They formed in thin deposits of glacial till over shale bedrock and have a large amount of shale fragments in their profile. Depth to bedrock ranges from 10 to 20 inches.

The Nassau soils commonly are near the Lordstown and Mardin soils in the southern part of the county; in the northern part they are near the Mohawk soils.

A profile of Nassau soils commonly has a plow layer of very dark grayish-brown, friable shaly silt loam 5 to 8 inches thick. The upper part of the subsoil is yellowish-brown, friable very shaly silt loam 6 to 14 inches thick. The lower part of the subsoil is olive-brown, friable very shaly silt loam less than 6 inches thick, but this layer does not occur in all places. Shale bedrock occurs at a depth of 10 to 20 inches.

Because the content of shale is high and the soil is shallow to bedrock, Nassau soils have low available moisture capacity. Plants of these soils are damaged quickly by drought in summer. Root penetration is fair, and in places the roots grow into the voids of the fractured shale.

Liming is one of the most important needs where crops are grown. The supply of nitrogen is moderate, but plants grow better with additional nitrogen. The supply of available phosphorus is low, and that of potassium is moderate.

Nassau shaly silt loam, 2 to 15 percent slopes (NaC).—This soil occurs on hillsides and on the tops of nearly level plateaus. Much of it is not seriously eroded, but about one-fourth of the acreage has lost most of its original surface layer. The profile of this soil is the one described as typical for the Nassau series.

Included with this soil are small wet spots of Allis and Chippewa soils. Also included are small areas of Arnot, Lordstown, and Mardin soils.

This Nassau soil is suited to cultivated crops, pasture, and trees. Shallowness and droughtiness are the main limitations to use for crops, and the hazard of erosion is a limitation in the more sloping areas. Because bedrock is so near the surface, it is a concern where this soil is used for buildings and other construction. (Capability unit IIIs-1; woodland suitability group 9)

Nassau shaly silt loam, 15 to 35 percent slopes (NaE).—Except that it is generally shallower and has more shale fragments in the surface layer, this soil has a profile similar to the one described as typical for the Nassau series. The slopes are so steep that modern farm machinery can be used only with difficulty. The hazard of erosion is serious.

This soil is mainly on side slopes along with other Nassau soils. It is near the Lordstown and Mardin soils on hilltops and the Volusia soils on foot slopes. Chippewa soils occur with this soil in areas of seeps and in wet depressions.

Because of steep slopes and coarse fragments in the surface layer, this soil is not suited to cultivated crops. It is suited to trees, and it provides limited pasture early in spring. Because of shallowness and droughtiness, growth of pasture plants generally is poor. (Capability unit VIs-1; woodland suitability group 9)

Norwich Series

The Norwich series consists of deep, poorly drained and very poorly drained, medium-textured soils that occur in the glaciated uplands in the southern part of the county. These soils are nearly level in depressions and are moderately steep in seepy areas. They formed in glacial till that was derived mainly from red sandstone and some red shale. The surface layer is thin and mucky in places and is slightly acid or neutral. Norwich soils typically support reeds, sedges, rushes, willows, alders, and other plants that tolerate wetness. Wooded areas are mostly in red maple, elm, and some hemlock.

The Norwich soils are adjacent to the better drained Oquaga, Cattaraugus, Culvers, and Morris soils.

A profile of Norwich soil commonly has a surface layer of dark reddish-brown, friable stony silt loam ½ inch to 6 inches thick that is rich in organic matter. This layer overlies a leached layer of distinctly mottled, weak-red, firm stony silt loam 3 to 11 inches thick. The subsoil is a fragipan of mottled brown, extremely firm, dense very gravelly loam 9 to 13 inches thick. It overlies an equally dense substratum that consists of reddish-gray very gravelly loam glacial till that is mottled. Norwich soils normally are deep, but in a few places bedrock is at a depth of less than 40 inches.

In the Norwich soils, the water table is at or near the surface for long periods during the year. Early in spring it keeps the soil too wet for tillage because it is within 6 to 8 inches of the surface. A few days after a rain in June, these soils can be tilled because the water table drops to about the top of the fragipan. Because of wetness, these soils remain cold until late in spring and plants grow slowly until the middle of May. During normally dry periods in summer, moisture is adequate for plant growth. The content of nitrogen is high, but the nitrogen is released too slowly in spring to be of much benefit to plants. The supply of phosphorus and potassium is medium. The content of lime in the surface layer varies.

In this county the Norwich soils are mapped only in undifferentiated groups with Chippewa soils. A profile typical for the Chippewa soil, and mapping units containing Norwich soils, are described under the Chippewa series.

Nunda Series

The Nunda series consists of deep, well drained and moderately well drained soils that are medium acid to strongly acid in the upper part and neutral to calcareous in the substratum. These soils formed in two layers of glacial till. The uppermost till layer was medium textured and acid; the lower was moderately fine textured and calcareous. They commonly occur on drumlinlike hills in the northern part of the county. The Nunda soils are adjacent to the Erie, Burdett, Darien, and Langford soils.

A profile of Nunda soils commonly has a plow layer of dark grayish-brown, friable channery silt loam 3 to 10 inches thick. The next layer is yellowish-brown, very friable channery silt loam 3 to 9 inches thick. Below this layer is a leached layer of mottled, light olive-brown, firm channery silt loam 3 to 6 inches thick. The subsoil is mottled, dark grayish-brown, firm channery clay loam that has somewhat restricted drainage and extends to a depth of 24 to 40 inches. The substratum is grayish-brown, firm, dense glacial till of channery heavy loam or light clay loam texture. It is mottled and calcareous. In most areas the profile contains fragments of shale and limestone.

During April the Nunda soils generally are too wet to be tilled, but by May they have dried to a depth of about 20 inches and can be tilled except for a few days after rains. Roots of most crops penetrate the upper 18 to 24 inches of soil, and a few roots extend to depths of 36 to 48 inches along the cracks in the subsoil. The normal root zone has high water-holding capacity, and in most years enough moisture is available for plant growth.

The supply of plant nutrients in Nunda soils is moderate. The surface layer is medium acid to strongly acid, and additions of lime and fertilizer are needed for good crop growth.

Nunda channery silt loam, 3 to 10 percent slopes (NdB).—This soil is in slightly convex areas and is the one described as typical for the series. Areas of this soil are moderately large and in many places occupy an entire drumlike hill.

This soil is near the Darien soils, and small areas of those soils are included in mapped areas. Also included are areas of Ilion and Lyons soils in small drainageways.

This Nunda soil is suited to cultivated crops, pasture, and trees. Most of the acreage is in crops. Corn, small grains, and hay are the crops most commonly grown and are well adapted. Control of runoff and erosion are important concerns of management on the steeper slopes. (Capability unit IIe-5; woodland suitability group 1)

Nunda channery silt loam, 10 to 20 percent slopes (NdC).—This soil commonly is on the sides of drumlinlike hills and is one of the drier Nunda soils. It is steep enough that runoff is rapid and the operation of farm machinery is difficult or hazardous.

This soil is near other Nunda soils and the Darien soils. Small areas of these soils are included in mapped areas.

This Nunda soil is suited to cultivated crops, pasture, and trees. Control of runoff and erosion are important concerns of management. (Capability unit IIIe-5; woodland suitability group 1)

Nunda channery silt loam, 10 to 20 percent slopes, eroded (NdC3).—This eroded soil has lost much of its original surface layer, and the plow layer is mostly subsoil material. This layer generally is lighter colored and contains less organic matter than the plow layer of uneroded Nunda soils. Because the subsoil is fine textured, dense, compact, and is closer to the surface than that in uneroded Nunda soils, runoff is more rapid, the hazard of erosion is greater, and water-holding capacity is less.

Included with this soil in mapping were small areas of Burdett, Ilion, and Madalin soils. Some uneroded and severely eroded areas also are included. Consequently,

depth to the fine-textured, compact subsoil varies widely within short distances, and so do the water-holding capacity and similar properties.

This Nunda soil is suited to cultivated crops, hay and pasture, and trees. It is generally better suited to hay and pasture than to cultivated crops. (Capability unit IVe–2; woodland suitability group 1)

Nunda channery silt loam, 20 to 30 percent slopes (NdD).—This moderately steep soil is on the sides of long hills. It is near other Nunda soils and the Darien soils. Small areas of these nearby soils are included in mapped areas.

This Nunda soil can be used for cultivated crops, hay and pasture, and trees. Hay and pasture generally are more suitable than cultivated crops because the erosion hazard is high. (Capability unit IVe–7; woodland suitability group 1)

Nunda channery silt loam, 20 to 30 percent slopes, eroded (NdD3).—Because erosion has removed most of the original surface layer of this soil, the plow layer consists almost entirely of subsoil material. This layer generally is light in color, low in organic-matter content, and moderately fine textured. The fine-textured, compact subsoil is at or near the bottom of the plow layer.

Because water does not penetrate the subsoil readily, runoff is more rapid and the hazard of erosion is higher than on the uneroded Nunda soils. Also, the water-holding capacity is less.

Included with this soil are small areas of Burdett, Ilion, and Madalin soils. Also included are small uneroded areas and larger severely eroded areas. Consequently, depth to the fine-textured, compact subsoil, the organic-matter content, the water-holding capacity, and similar properties vary over short distances.

This Nunda soil is suited to trees and pasture. (Capability unit VIe–1; woodland suitability group 1)

Nunda and Langford channery silt loams, 3 to 8 percent slopes (NlB).—These soils are on low uplands in the northern parts of the county. Slopes are long and smooth. Some areas are made up of only the Nunda soil, other areas of only the Langford soil, and still others of both of these soils. Each of these soils has a profile similar to the one described as typical for its respective series, but the fragipan, or compact subsoil, is closer to the surface.

These sloping soils are near the wetter Burdett and Erie soils, which are included in some mapped areas. Also included are small wet areas of Ilion and Lyons soils.

The soils in this group are suited to cultivated crops, pasture, and trees. Because there is a slight hazard of erosion, protective measures are needed if these soils are cultivated. Water control is important where these soils are used for community developments and recreation. (Capability unit IIe–6; woodland suitability group 1)

Nunda and Langford channery silt loams, 8 to 15 percent slopes (NlC).—These soils have short slopes and occur on the sides of drumlinlike hills. Some areas are made up of only the Nunda soil, other areas of only the Langford soil, and still others of both of these soils. Each of these soils has a profile similar to the one described as typical for its respective series. The fragipan, or compact subsoil, is at a depth slightly greater than that in the less sloping Nunda and Langford soils. Also, these soils dry earlier in spring, and plants on them are damaged by drought earlier in summer. These soils generally are adjacent to the wetter Burdett, Erie, Ilion, and Lyons soils that commonly occupy the drainageways.

The soils in this group are suited to cultivated crops, pasture, and trees. Much of the acreage is used for dairy farming. Control of runoff and erosion are important concerns of management. These soils provide good sites for buildings, but special care is needed for controlling water and installing septic tank systems for sewage disposal. (Capability unit IIIe–6; woodland suitability group 1)

Nunda and Langford channery silt loams, 8 to 15 percent slopes, eroded (NlC3).—Some areas are made up of only the Nunda soil, other areas of only the Langford soil, and still others of both of these soils. Because most of the original surface layer of these soils has been removed through erosion, the plow layer is mainly subsoil material. Except that the surface layer is lighter colored and contains less organic matter, each soil has a profile similar to the one described as typical for its respective series.

Included with these soils are small areas of Burdett, Erie, Ilion, and Lyons soils. Also included are small areas of Nunda and Langford soils that are uneroded and some that are severly eroded.

In these eroded Nunda and Langford soils, the fragipan, or dense, compact subsoil, is closer to the surface than it is in the uneroded soils. Consequently, the permeability is slower, the water-holding capacity is lower, runoff is more rapid, and the hazard of erosion is greater.

The soils in this group are suited to cultivated crops, hay and pasture, and trees, but hay or pasture generally are more suitable than cultivated crops. (Capability unit IVe–4; woodland suitability group 1)

Nunda and Langford channery silt loams, 15 to 25 percent slopes (NlD).—These soils are on the sides of long, drumlinlike hills. Some areas are made up of only the Nunda soil, other areas of only the Langford soil, and still others of both of these soils. Each of these soils has a profile similar to the one described as typical for its respective series.

Included with these soils are small areas of the wetter Burdett, Erie, Ilion, and Lyons soils in the drainageways.

The soils in this group are suited to cultivated crops, hay and pasture, and trees. Because the soils are steep, farm machinery can be used only with great difficulty. Runoff and erosion are the main concerns of management, but drought damages most plants, even in short dry periods. Hay and pasture generally are more suitable than cultivated crops. (Capability unit IVe–3; woodland suitability group 1)

Odessa Series

The Odessa series consists of deep, somewhat poorly drained, moderately fine textured soils that are mainly in Schoharie Valley and small valleys in the southeastern part of the county. These valleys once were occupied by glacial lakes. Odessa soils formed in red, calcareous, lakelaid clay. They are medium acid to neutral in the upper part of the profile. Slopes are uniform and mainly gentle. In many places water from adjacent higher soils accumulates on Odessa soils.

The Odessa soils are adjacent to the wetter Lakemont soils and the better drained Schoharie soils in valleys. Nearby are the Barbour soils on flood plains, and the Tunkhannock soils on glacial outwash terraces. Where the lake-

laid material is thin over glacial till, the Odessa soils are adjacent to the Cattaraugus, Honeoye, Nunda, Langford, and wetter soils that developed from similar materials.

A profile of Odessa soils commonly has a plow layer of dark-gray, friable silty clay loam or silt loam 6 to 11 inches thick. The subsoil is mottled dark-brown to reddish-brown, firm silty clay that is moderately slowly permeable and that extends to a depth of 36 to 48 inches. The substratum is dark reddish-gray to reddish-gray, firm, calcareous silty clay that contains thin lenses of silt. In places a leached layer of mottled light brownish-gray silty clay loam occurs between the plow layer and the subsoil. The subsoil is mostly silty clay loam in texture, and where the texture is finest, the clay content is nearly 60 percent. In most places the surface layer is silty clay loam, but it ranges to silt loam. In some places the lake-laid deposits are thin, and in these places glacial till or outwash may be only 24 inches from the surface.

Early in spring free water is at or near the surface, and these soils are too wet to be cultivated. By May, however, the water table has fallen to a depth of about 20 inches, and these soils can be tilled after several days of dry weather. They can be tilled any time in June except for a day or two after a heavy rain. If these soils are plowed when they are too wet, soil structure is destroyed and the surface layer clods. Most roots are in the upper 18 to 24 inches, though some penetrate along cracks to a depth of 3 to 4 feet. The root zone has moderate water-holding capacity. During dry periods crops are damaged after only a week or two without rain.

The surface layer, or plow layer, is rich in organic matter. It also contains a large amount of nitrogen, but the nitrogen is released so slowly that in most places it is not adequate for plants. The reserve of potassium is also present in large amounts, but in places it is released so slowly that rapidly growing plants benefit if potassium is added. The supply of phosphorus is moderate, and additional amounts are needed for good growth of most crops.

In Schoharie County, Odessa soils are mapped only in undifferentiated groups with Rhinebeck soils.

Odessa and Rhinebeck silt loams, 0 to 2 percent slopes (OdA).—These soils are nearly level, or they occur in slight depressions where they receive additional water from higher areas. Some areas of this group are made up of only the Odessa soil, other areas of only the Rhinebeck soil, and still others of both of these soils. Each of these soils has a profile similar to the one described as typical for its respective series. The soils in this group have a darker colored surface layer and a higher content of organic matter than those Odessa and Rhinebeck soils that are more sloping and less wet.

Common inclusions are small spots of better drained Schoharie and Hudson soils on knolls and wetter Lakemont and Madalin soils in depressions and along drainageways.

The soils of this group are suited to cultivated crops, pasture, and trees, though the choice of crops is limited by wetness. Legumes that tolerate wetness can be used for hay and pasture. Corn and small grains are adapted, but growth is poor in wet years. (Capability unit IIIw-3; woodland suitability group 5)

Odessa and Rhinebeck silt loams, 2 to 6 percent slopes (OdB).—Some areas of this group are made up of only the Odessa soil, other areas of only the Rhinebeck soil, and still others of both of these soils. Each of these soils has a profile similar to the one described as typical for its respective series. Although these gently sloping soils receive runoff from adjacent higher areas, the soils slope enough for some of the water to run off.

These soils are adjacent to the better drained Schoharie and Hudson soils on hills and the wetter Lakemont and Madalin soils in enclosed basins. Some small areas of these soils are included in mapped areas.

The soils of this group are suited to cultivated crops, pasture, and trees. Wetness and the hazard of erosion are the main concerns of management. (Capability unit IIIw-3; woodland suitability group 5)

Odessa and Rhinebeck silt loams, 6 to 12 percent slopes (OdC).—Some areas of this group are made up of only the Odessa soil, other areas of only the Rhinebeck soil, and still others of both of these soils. Except that they are drier and have a lighter colored surface layer, the soils in this group are similar to Odessa and Rhinebeck silt loams, 2 to 6 percent slopes. Slopes of these soils are uniform and slightly convex. Many areas are crossed by shallow drainageways that are wet in spring.

These soils are adjacent to the better drained Schoharie and Hudson soils, from which they receive runoff. Small knolls of Schoharie and Hudson soils commonly are included in mapped areas.

The soils of this group are suited to cultivated crops, pasture, and trees. The hazard of erosion and slight wetness are the main concerns of management. (Capability unit IIIe-10; woodland suitability group 5)

Odessa and Rhinebeck silty clay loams, 6 to 12 percent slopes, eroded (OrC3).—In most areas much of the original surface layer of these Odessa and Rhinebeck soils has been removed through erosion, and the plow layer now is a mixture of the original surface layer and the more clayey subsoil material. The plow layer has finer texture, poorer structure, less organic matter, and slower permeability than the original surface layer. The soils are therefore more difficult to cultivate and are more susceptible to erosion than uneroded Odessa and Rhinebeck soils. On the less sloping parts of this group, little erosion has occurred and some areas have received deposition.

These soils commonly are downslope from and adjacent to the better drained Schoharie and Hudson soils, from which they receive runoff. In many places soils of this group are crossed by shallow drainageways that are wet in spring.

Because of past erosion, the soils of this group have limited suitability for cultivated crops. Cropping systems that favor sod crops tolerant of wetness are more desirable. These soils are also suited to pasture and trees. (Capability unit IVe-5; woodland suitability group 6)

Oquaga Series

The Oquaga series consists of moderately deep, well-drained, gently sloping to steep soils on the Allegheny Plateau in the southern part of the county. Because the bedrock is sandstone and shale that lie in layers, these soils commonly occur in a "stairstepped" landscape. Rock commonly crops out as steep cliffs separating the steps. The Oquaga soils developed in thin deposits of glacial till that contain large amounts of red sandstone and siltstone and a smaller amount of red shale. Depth to bedrock ranges

from 20 to 40 inches. These soils are medium acid or strongly acid.

The Oquaga soils occur mainly in areas dominated by the deep Cattaraugus and Culvers soils. They are also adjacent to the wetter, gently sloping Morris and Norwich soils and the shallow Arnot soils.

A profile of Oquaga soils commonly has a plow layer of reddish-brown, friable stony silt loam 5 to 8 inches thick. The upper part of the subsoil is reddish-brown, very friable stony silt loam 9 to 15 inches thick. The lower part is dark reddish-brown, friable channery silt loam that extends to a depth of 20 to 40 inches and that overlies sandstone or shale bedrock. In some places a thin, mottled layer directly overlies the bedrock. This mottling indicates that a water table is perched above the bedrock in spring.

The ability of Oquaga soils to hold water available to plants varies, depending on the depth to bedrock. Growth of plants during dry summers is more restricted where the soils have the least depth, because in these areas water-holding capacity is lower. Root penetration above the bedrock is good.

The supply of available nitrogen is moderate, but crops on these soils respond well to additions of nitrogen. The supply of available phosphorus and available potassium is moderate. Where these soils are cropped heavily, potash fertilizer must be added so as to maintain good growth of crops. Many stones and rock fragments on and in the surface layer make tilling and havesting difficult.

The very stony and very steep areas of Oquaga soils are described under the Lordstown series as part of an undifferentiated group.

Oquaga stony silt loam, 3 to 15 percent slopes (OsC).—Gently sloping areas of this soil are on the sides of valleys near steeper Oquaga soils, and gently rolling areas are on hilltops and are near Arnot, Cattaraugus, and Culvers soils. Where slopes are long and gentle, this soil is near the Morris soils. Included with this soil are small seepy areas of Norwich and small areas of Cattaraugus and Culvers soils.

This Oquaga soil is suited to cultivated crops, pasture, and trees. Although stone fragments interfere, this soil is tillable with modern farm machinery. Water penetrates this soil readily, but runoff occurs on the steeper slopes. Erosion is a moderate hazard where the soil is left bare or is used for row crops. Shallowness to bedrock hinders many nonfarm uses. (Capability unit IIIe-3; woodland suitability group 3)

Oquaga stony silt loam, 15 to 25 percent slopes (OsD).—This soil is mainly on the sides of valleys near other Oquaga soils. Also, it is near the Cattaraugus and Culvers soils on hilltops and the Morris soils on foot slopes. Included with this soil are small seepy areas of Norwich soils and small areas of Arnot, Cattaraugus, Culvers, and Morris soils.

This soil is suited to crops, but cultivation is difficult because of steepness. It is better suited to hay, permanent pasture, or trees. (Capability unit IVe-3; woodland suitability group 3)

Oquaga stony silt loam, 25 to 35 percent slopes (OsE).—This soil is mainly on the steeper sides of valleys in the southeastern part of the county. It is near the Arnot and other Oquaga soils and the deep Cattaraugus, Culvers, and Morris soils. Small areas of these soils are included with this soil. Also included are small seepy areas of Norwich soils. In most areas rock crops out in places as steep cliffs, and these form huge steps on the hillside.

This soil is suited to pasture or trees. Unless this soil is limed and fertilized, growth of pasture plants is poor. The use of machinery is difficult and hazardous because of steepness. Rainwater runs off readily, and pastures are damaged by drought in most years. (Capability unit VIe-1; woodland suitability group 4)

Papakating Series

The Papakating series consists of deep, very poorly drained, medium-textured and moderately fine textured soils in low-lying areas of bottom lands in the southern part of the county. These soils formed in strongly acid to slightly acid alluvium that was derived from sandstone and shale. They are adjacent to the poorly drained and somewhat poorly drained Holly soils and the better drained Barbour, Tioga, Basher, and Middlebury soils on bottom lands.

A profile of Papakating soils commonly has a surface layer of very dark brown, friable silt loam 10 to 18 inches thick. This layer is rich in organic matter. The substratum is directly beneath the surface layer and extends to a depth of about 48 inches. It is gray and dark-gray, firm silty clay loam in the uppermost 23 inches, and below that consists of dark-gray, firm silt interbedded with layers of dark-brown woody peat and layers of dark-brown sand. Some areas that are near lake-laid sediments have silty clay layers in their substratum. The kind and proportion of layers in the substratum vary widely from place to place.

The Papakating soils have a water table at the surface early in spring, late in fall, and in winter, and seldom is the water table more than 15 or 20 inches from the surface. These soils are ponded after heavy rains, and generally they are the first to be flooded when streams rise.

The supply of available phosphorus and potassium is moderate. The supply of nitrogen is high, but because of wetness little nitrogen is available to plants. Wetness is the main concern of management.

In this county Papakating soils are mapped only with Holly soils as an undifferentiated group. A profile typical for the Holly series, and a mapping unit containing Holly and Papakating soils, are described under the Holly series.

Phelps Series

The Phelps series consists of deep, moderately well drained soils on glacial outwash terraces in the valleys of streams that drain the medium- and high-lime soils of low plateau areas in the northern part of the county. These soils are not extensive in this county. They developed in high-lime, gravelly and sandy glacial outwash. The slight wetness is caused by either a high water table or restrictive layers in the substratum.

These soils are near the well-drained Howard, the somewhat poorly drained and poorly drained Fredon, and the poorly drained and very poorly drained Halsey soils, all of which developed in material similar to that of the Phelps soils. In places they are near Schoharie and Hudson soils, which developed in lake-laid sediments.

A profile of Phelps soils commonly has a plow layer of dark grayish-brown, friable gravelly silt loam 5 to 9 inches thick. It is underlain by light olive-brown, friable loam that extends to a depth of about 15 inches. The upper part of the subsoil is olive-brown, firm to friable gravelly loam 6 to 8 inches thick; the lower part is olive-brown, faintly mottled, friable very gravelly loam that extends to a depth of 20 to 30 inches. The calcareous substratum consists of layers of gravel, sand, silt, or clay.

Phelps soils have high to moderate water-holding capacity. Early in spring the water table is at a depth of 12 to 20 inches. Near the end of spring the soil is dry enough to be tilled except after heavy rains. During dry summers, however, these soils are droughty. Depth of root penetration for most crops ranges between 15 and 30 inches and generally is determined by depth of the water table or a slowly permeable layer of silt or clay.

Phelps soils have a low to moderate requirement for lime. The supply of available phosphorus and potassium is moderate.

Phelps gravelly silt loam, 0 to 5 percent slopes (PhA).—This soil is in the valleys of Cobleskill and West Creeks and in places in the valley of Fox Creek. It has the profile described as typical for the Phelps series. Mapped areas of this soil include Howard soils on small knobs and small areas of wet Fredon and Halsey soils.

This soil is suited to cultivated crops, pasture, and trees. Slight seasonal wetness is the main concern of management where this soil is used for farming or for many nonfarm purposes. (Capability unit IIw–1; woodland suitability group 2)

Phelps gravelly silt loam, clay substratum, 2 to 8 percent slopes (PlB).—This soil is on gently rolling, slightly convex outwash plains, mainly in the northern part of the county and in the valley of Schoharie Creek. It also occurs in valleys along West Creek and near Seward and Dorloo. Except that it has a clay substratum at a depth of 24 to 36 inches, this soil has a profile similar to the one described as typical for the Phelps series. This clay layer is slowly permeable and causes the lower part of the subsoil to be saturated with water for long periods.

Small wet areas of Lakemont and Madalin soils are included throughout areas mapped as this soil. Also included are areas of Phelps soils that have a gravelly loam to gravelly fine sandy loam surface layer.

This soil is suited to cultivated crops, pasture, and trees. Slight wetness and a moderate hazard of erosion are the main concerns of management if this soil is farmed or used for many nonfarm purposes. (Capability unit IIe–4; woodland suitability group 2)

Red Hook Series

The Red Hook series consists of deep, somewhat poorly drained, medium acid soils that are primarily in the larger valleys that dissect the high plateau areas of the county. These soils formed in acid, gravelly outwash that contained large amounts of sandstone, siltstone, and shale. The wetness is caused by either an impermeable layer within 3 to 5 feet of the surface or a generally high water table.

These soils are mostly adjacent to the Tunkhannock and Chenango soils in depressions of the glacial outwash and on old alluvial fans in the same general area. They also are near the Barbour and Tioga soils on bottom lands and Mardin and Cataraugus soils on uplands.

A profile of Red Hook soils commonly has a plow layer of very dark grayish-brown, friable gravelly silt loam 6 to 10 inches thick. The upper part of the subsoil is grayish-brown, firm gravelly silt loam that is distinctly mottled and about 2 inches thick; the lower part is olive-brown to dark-brown, very firm gravelly silt loam that is distinctly mottled and extends to a depth of 26 to 36 inches. The substratum is dark-gray to olive-gray, medium acid glacial outwash consisting mainly of layers of sand, silt, and gravel.

Red Hook soils stay wet and cold until late in spring. Early in spring and after heavy rains the water table is at or near the surface, but late in spring it starts to fall and by mid-June the soil is dry enough to work. During dry summers, however, plants on these soils are damaged by drought. In years of normal rainfall the water table is in the lower part of the subsoil for long periods.

Because the surface layer is moderately high in organic-matter content, these soils hold a large amount of plant nutrients. The content of nitrogen is moderately high, but little is released in spring and plant growth is poor. The supply of available phosphorus and potassium is moderate. Most drained areas have adequate moisture in summer for plant growth.

Red Hook gravelly silt loam (0 to 5 percent slopes) (Rh).—This soil has the profile described as typical for the Red Hook series. Slopes generally are less than 3 percent. This soil is in depressions or on fans near the Tunkhannock and Chenango soils. Small areas of better drained soils are commonly included in mapped areas. Where this soil is near the Tunkhannock soils, it has a redder profile than the one described as typical for the Red Hook series.

This soil is suited to cultivated crops, pasture, and trees. Wetness is the main concern of management where this soil is farmed or used for many nonfarm purposes. Undrained areas are suited only to those crops that tolerate periodic wetness. (Capability unit IIIw–1; woodland suitability group 5)

Rhinebeck Series

The Rhinebeck series consists of deep, somewhat poorly drained soils. These soils occur in valleys, where they formed in dominantly gray, calcareous, stratified lake-laid clay. Slopes are mainly uniform and gentle, and runoff from adjacent higher soils accumulates on these soils.

These soils are adjacent to the poorly drained and very poorly drained Madalin soils that are nearly level and in depressions. They are also adjacent to the moderately well drained Hudson soils that are in higher, more sloping areas. Where the lake-laid material is thin over glacial till, the nearby soils are the Darien and other soils that formed in glacial till. Soils nearby on bottom lands are the Tioga and other less well drained soils.

A profile of Rhinebeck soils commonly has a plow layer of very dark grayish-brown, friable silt loam 6 to 9 inches thick. The subsoil extends to a depth of 30 to 48 inches. It is grayish-brown to dark grayish-brown, firm silty clay loam and silty clay that are prominently mottled. The substratum is dark-gray, calcareous silty clay or silty clay loam in thick layers that are separated by thin layers of silt. In places a thin leached layer of mottled, pale-brown

or light brownish-gray silt loam or silty clay loam is just above the slowly permeable subsoil.

Early in spring free water is at or near the surface of these soils and they cannot be cultivated. By May the water table has fallen to a depth of about 20 inches; then these soils can be cultivated except for several days after rainy periods. They can be cultivated at any time in June except for a day or two after heavy rains. If these soils are plowed when wet, they become puddled and a mass of large clods forms on the surface. Roots penetrate along cracks to a depth of 3 feet or more, but most roots are in the uppermost 18 to 24 inches of soil, which has moderate water-holding capacity.

In some places Rhinebeck soils are nearly neutral and lime is not needed, but in other places they are strongly acid in the plow layer. Although the supply of potassium is high, this element may not be released to fast-growing plants as rapidly as needed and additional potassium may be required. Phosphorus occurs in moderate amounts, but more is needed for good growth of most crops. Although Rhinebeck soils are among the most fertile in the county, wetness, poor tilth, and the hazard of erosion are serious concerns of management.

In Schoharie County, Rhinebeck soils are mapped only with Odessa soils as an undifferentiated group. A profile typical for Odessa soils, and mapping units containing Odessa and Rhinebeck soils, are described under the Odessa series.

Schoharie Series

The Schoharie series consists of deep, well drained and moderately well drained, gently sloping to steep soils in valleys that formerly were occupied by glacial lakes in the southern and eastern parts of the county. These soils formed in reddish, calcareous, lake-laid clay and silt. In most places they are lower than 1,300 feet above sea level.

Schoharie soils are adjacent to the somewhat poorly drained Odessa and the poorly drained and very poorly drained Lakemont soils that developed in materials similar to those of Schoharie soils. Nearby on bottom lands are the Barbour soils, and in the uplands many kinds of soils are adjacent to Schoharie soils along the valley of Schoharie Creek and its southern tributaries. The Schoharie soils are similar to Hudson soils that developed in grayish-brown sediments.

A profile of Schoharie soils commonly has a plow layer of brown to dark-brown, friable silt loam 5 to 8 inches thick. This layer overlies a leached layer of brown, firm silt loam 2 to 4 inches thick. The upper part of the subsoil is light reddish-brown, firm silty clay loam that is faintly mottled and 5 to 15 inches thick. It has strong blocky structure. The lower part is reddish-brown, very firm silty clay that has strong blocky structure and extends to a depth of 36 to 50 inches. The substratum is reddish-brown, very firm, calcareous silty clay that commonly consists of laminated clay and silt.

The plow layer in eroded areas is richer in clay than that in uneroded areas. The subsoil ranges from about 35 to 60 percent clay, and the amount depends on the proportion of clay and silt in the original lake-laid deposit. The thickness of the lake-laid deposits over glacial till or outwash ranges from 3 to 6 feet in some places but is more than 20 feet in other places. The Schoharie soils are mainly free of stones, but in places they are gravelly.

The Schoharie soils are difficult to till early in spring because of wetness, but early in May they have dried enough to be worked with farm machinery except for a few days after heavy rains. If they are worked when wet, these soils become puddled and clods form readily. Roots are mainly in the upper 20 to 24 inches, but the roots of alfalfa and some other plants penetrate in cracks to a depth greater than 4 feet. The upper 20 to 24 inches, however, is the main root zone from which plants obtain water and nutrients, and this zone can hold 3 to 4 inches of water that plants can use. This amount of water is not adequate during dry periods, and in midsummer after 10 to 15 days without rain, plants show need for moisture.

Schoharie soils vary widely in the amount of lime required for crops. The supply of available potassium is large, but alfalfa and other plants that use large amounts respond to added potassium. The supply of available phosphorus is moderately low. The supply of nitrogen is moderately high, but it is released too slowly for rapidly growing plants. Fertilizer containing both phosphorous and nitrogen are therefore needed for good growth of crops. The Schoharie soils are good for farming, but they are susceptible to erosion.

Schoharie and Hudson silt loams, 2 to 6 percent slopes (ShB).—The soils of this group have gentle convex slopes. Runoff is medium, and little runoff is received from adjacent higher soils. Some areas are made up of the moderately well drained Schoharie soil, other areas of only the Hudson soil, and still others of both of these soils. Each of these soils has a profile similar to the one described as typical for its respective series.

Most areas of these soils are adjacent to the somewhat poorly drained Odessa and Rhinebeck soils.

Included with these soils are Odessa, Rhinebeck, Lakemont, and Madalin soils in small depressions. Also included are small areas of eroded soils on knolls.

The soils of this group are suited to cultivated crops, pasture, and trees. Vegetables also grow well if good soil structure is maintained. These soils are slightly wet in spring, and the hazard of erosion is moderate to high. These soils are well suited to many nonfarm uses, but they have a clay substratum that is unstable and seriously limits their use for some nonfarm purposes. (Capability unit IIe-5; woodland suitability group 1)

Schoharie and Hudson silt loams, 6 to 12 percent slopes (ShC).—These soils are mainly on convex sides of valleys and, in many places, are dissected by shallow drainageways. Some areas are made up of only the Schoharie soil, other areas of only the Hudson soil, and still others of both of these soils. Except for lighter color, each of these soils has a profile similar to the one described as typical for its respective series.

Included in mapped areas of this group are small areas of the wetter Odessa and Rhinebeck soils in drainageways. Also included in the larger valleys are a few small sandy areas on knolls.

The soils of this group can be used for cultivated crops, pasture, and trees. They are slightly wet at times, and clods form readily if the soils are mismanaged. Because the subsoil is unstable, these soils are poorly suited to some nonfarm uses. They are severely limited for disposal of

septic tank effluent. (Capability unit IIIe–7; woodland suitability group 1)

Schoharie and Hudson silty clay loams, 2 to 6 percent slopes, eroded (SnB3).—The landform of this group is convex and commonly is undulating. The slopes are mainly gentle, but soil material has been eroded from the more sloping areas and deposited in basins and depressions downslope. Some areas are made up of only the Schoharie soil, other areas of only the Hudson soil, and still others of both of these soils. Except for the eroded surface layer, each of these soils has a profile similar to the one described as typical for its respective series.

Most of the original surface layer of these soils has been lost through erosion. The plow layer consists of a mixture of material from the original surface layer, the thin leached layer below it, and some of the more clayey subsoil material. Erosion has not been uniform on these soils. In plowed areas the subsoil is exposed on knolls, but all the soil material above the subsoil has been removed in only about 10 percent of mapped acreage.

These soils mainly are near the somewhat poorly drained Odessa and Rhinebeck soils and the steeper Schoharie and Hudson soils. Small areas of the wetter Odessa and Rhinebeck soils are included with this group.

The soils of this group are suited to crops, pasture, or trees. Crops grown for forage in support of dairy farming are among the better adapted crops. Because the soils have fine texture and generally poor structure, they are not well suited to row crops. They provide fair sites for residences and industrial buildings that are served by sewer lines, but they are poor for disposal of septic tank effluent. (Capability unit IIIe–8; woodland suitability group 1)

Schoharie and Hudson silty clay loams, 6 to 12 percent slopes, eroded (SnC3).—Much of the acreage of this group has fairly long, convex slopes and is along the sides of valleys. Water from adjacent higher soils flows across these soils in shallow drainage channels. This group generally occupies an entire field. In approximately 75 to 85 percent of the acreage, all or part of the original silt loam surface layer of these soils has been lost through erosion. About 15 percent of the acreage is uneroded. In the eroded areas, enough subsoil material has been mixed into the plow layer to make it silty clay loam or silty clay in texture. The organic-matter content has been reduced.

Included with this group are small areas of the wetter Odessa and Rhinebeck soils in the drainage channels and in depressions.

The soils of this group are suited to crops, pasture, or trees. Runoff causes continuous erosion and loss of water needed by crops. These eroded soils generally are in poor tilth. They are better adapted to hay and pasture than to cultivated crops. Instability and slow permeability are the main limitations to use for many nonfarm purposes. (Capability unit IVe–6; woodland suitability group 1)

Schoharie and Hudson silty clay loams, 12 to 20 percent slopes, eroded (SnD3).—The soils of this group are similar to Schoharie and Hudson silty clay loams, 6 to 12 percent slopes, eroded, but slopes are shorter and steeper and the drainage channels generally are deeper. Some channels cannot be crossed by farm machinery.

Working these soils is difficult because of steep, complex slopes and a moderately fine textured surface layer. Also, the hazard of erosion is high. These soils therefore are better suited to pasture and trees than to tilled crops. Instability and steepness are the main limitations to use for many nonfarm purposes. (Capability unit VIe–1; woodland suitability group 1)

Schoharie soils, 20 to 40 percent slopes (SoE).—These soils occupy the steep sides of valleys and in most places are cut by deep channels that carry water only during wet periods. Most channels cannot be crossed by farm machinery. Many bare or sparsley vegetated areas indicate that mass slippage has occurred. In most cleared areas these soils have been severely eroded, and the surface layer has silty clay loam texture. In areas that never have been cleared and are now in trees, these soils are uneroded and the surface layer has silt loam texture.

The soils in this group are suited to trees and as wildlife habitat. Some areas can be used as native pasture. These soils are susceptible to erosion and generally are droughty. They are not suitable sites for buildings. (Capability unit VIe–1; woodland suitability group not assigned)

Scio Series

The Scio series consists of deep, moderately well drained soils. These soils are not extensive in this county. They formed in well-sorted, silty alluvium and lacustrine sediment near Dorloo and Seward.

These soils are adjacent to the wetter Fredon and Halsey soils that formed in coarser material and the Schoharie and Hudson soils that formed in finer textured sediment. They are also near the Tioga soils on bottom lands.

A profile of Scio soils commonly has a plow layer of dark grayish-brown, friable silt loam 8 to 10 inches thick. The upper part of the subsoil is light olive-brown, friable silt loam 4 to 12 inches thick; the lower part is pale-brown to brown, friable to firm silt loam that is distinctly mottled and is 10 to 20 inches thick. The substratum is mainly grayish-brown, firm silt loam that is prominently mottled, but in places it consists of layers of silt and very fine sand with lenses of clay.

The Scio soils have few or no coarse rock fragments. Where the soils are adjacent to soils formed in outwash or glacial till, they may contain some gravel. Texture of the subsoil in most places is silt loam, but in some places it is very fine sandy loam. Also, thin layers of clay occur in the subsoil in places. The deposits in which these soils formed generally are thicker than 3 feet, but they are less than 3 feet thick where these soils are adjacent to soils in glacial till or outwash.

Early in spring Scio soils are too wet to be tilled, but early in May they are dry enough to be tilled except for a few days after heavy rains. Most roots are in the upper 20 to 24 inches of these soils, and this root zone has high water-holding capacity. During dry summers, however, these soils dry to a depth of 3 feet or more, and crops are damaged by drought.

These soils are strongly acid to medium acid. The supply of potassium is low to moderate, and crops respond to added potassium. The supply of phosphorus and nitrogen is moderate, and these nutrients need to be added for good of crops.

The Scio soils are good for farming. Slight wetness limits the choice of crops to those that are somewhat tolerant of wetness. This wetness also delays tillage of these soils in spring.

Scio silt loam, 0 to 3 percent slopes (ScA).—This soil has the profile described as typical for the Scio series. It is nearly level or very gently sloping. Small areas of Fredon, Halsey, and Phelps soils are included with this soil in mapping. These included soils make up about 15 percent of this mapping unit.

This soil is suited to crops, pasture, or trees. It is well adapted to crops commonly grown for forage. A fairly high seasonal water table is a serious limitation to use of this soil as sites for houses and for other construction. (Capability unit IIw–1; woodland suitability group 2)

Tioga Series

The Tioga series consists of deep, well-drained soils on bottom lands. These soils formed in recent alluvium from soils derived from gray sandstone, siltstone, and shale. Many areas are flooded annually for short periods, primarily during spring. The Tioga soils occupy the best drained parts of bottom lands. The larger areas are mainly in the northern part of the county along Cobleskill and Fox Creeks.

These soils are near the moderately well drained Middlebury, the somewhat poorly drained and poorly drained Holly, and the very poorly drained Papakating soils. In the northern part of the county, they are near the high-lime, poorly drained Wayland soils.

A profile of Tioga soils commonly has a plow layer of very dark grayish-brown, friable loam 6 to 12 inches thick. This layer is directly underlain by very dark grayish-brown and dark grayish-brown, friable loam that extends to a depth of 15 to 30 inches. Below this layer is dark grayish-brown, stratified silt, sand, and gravel.

Texture of the surface layer is mainly loam, but in some places it is gravelly loam and in a few places it is fine sandy loam. Tioga soils range from strongly acid to slightly acid in the upper part, but they may be calcareous at a depth of 3½ to 4 feet in areas of high-lime glacial till. Where these soils are on high bottoms, the subsoil is browner than the subsoil where these soils are flooded more frequently.

The Tioga soils are open and porous, and roots commonly penetrate to a depth of 40 inches. The moisture-holding capacity varies, depending on the depth of the silty material to the gravelly substratum. Normally, Tioga soils supply enough moisture for good growth of plants.

Most Tioga soils are slightly acid to strongly acid in the surface layer. The content of nitrogen is moderately high, but additional nitrogen is needed for good growth of crops. The supply of potassium and phosphorus is moderate. Tioga soils are among the better soils for farming in the county.

In Schoharie County, Tioga soils are mapped only with Barbour soils as an undifferentiated group. A profile typical of Barbour soils and mapping units are described under the Barbour series.

Tuller Series

In the Tuller series are shallow, somewhat poorly drained and poorly drained, nearly level to sloping soils. These soils formed in thin deposits of glacial till. Sandstone or siltstone bedrock is at a depth of 10 to 20 inches. Because the sandstone and siltstone are layered, "stair-stepped" landscapes and rock outcrops are common.

The Tuller soils are near the better drained, shallow Arnot soils and the moderately deep Lordstown and Oquaga soils. They are also near the deep Mardin, Volusia, and Chippewa soils.

A profile of Tuller soils commonly has a plow layer of dark grayish-brown, very friable silt loam 4 to 9 inches thick. The subsoil is mottled grayish-brown, friable channery silt loam that extends to a depth of 10 to 20 inches, where it is underlain by sandstone or siltstone bedrock. In places a thin, mottled gray, leached layer is just above bedrock.

Early in spring, water saturates Tuller soils to within a few inches of the surface. These soils have slow runoff, or they receive water that runs in from higher lying soils. Tuller soils stay wet and cold until early in June. Their moisture-holding capacity is low, but it is of little significance early in the year. These soils are droughty during dry periods.

Tuller soils are strongly acid, and lime is required for most crops. The supply of nitrogen is moderately high, but because of wetness nitrogen is released slowly in spring and early in summer. The supply of available phosphorus and potassium is moderate, and additions of these nutrients are needed for good growth of crops.

Tuller and Allis silt loams, 0 to 8 percent slopes (TaB).—These soils are on flats or in slight depressions. Some areas are made up of only the Tuller soil, other areas of only Allis soil, and still others of both of these soils. Each of these soils has a profile similar to the one described as typical for its respective series. Mapped areas include small areas of shallow Arnot and Nassau soils.

The soils of this group are poorly suited to cultivated crops. They are wet in spring and droughty in summer. Because bedrock is within 10 to 20 inches of the surface, these soils are difficult to drain. They are suited to hay, pasture, or trees if the plants and trees are shallow rooted and are tolerant of wetness. These soils are poorly suited to most nonfarm uses. (Capability unit IVw–3; woodland suitability group 10)

Tuller and Allis silt loams, 8 to 15 percent slopes (TaC).—This group consists of Tuller soil that is underlain by sandstone and Allis soil that is underlain by shale. The Allis soil is more extensive. Each of these soils has a profile similar to the one described as typical for its respective series. The soils in this group are drier than the less sloping Tuller and Allis soils.

Included with this group in mapping are small areas of the deeper Lordstown, Oquaga, and Volusia soils. These included areas are more extensive than in the Tuller and Allis silt loams, 0 to 8 percent slopes.

Wetness, shallowness to bedrock, and the hazard of erosion limit the use of soils in this group for crops. Hay, pasture, or woodland is a better use, particularly if trees or other plants are shallow rooted and are tolerant of wetness. Shallowness to bedrock and wetness are the main limitations to many nonfarm uses. (Capability unit IVw–3; woodland suitability group 10)

Tunkhannock Series

The Tunkhannock series consists of deep, well-drained to somewhat excessively drained, gravelly soils on ter-

races, kames, deltas, and alluvial fans. These soils formed in glacial outwash deposits of sand and gravel. In most places the deposits are thick, but at the edge of alluvial fans and in similar places, the deposits are only a few feet thick over glacial till or lake-laid clay. Bedrock generally is at a great depth. The outwash material was derived mainly from red standstone and siltstone and imparts the reddish color to Tunkhannock soils. Slopes range from 0 to 60 percent.

The Tunkhannock soils are similar to Chenango soils, which formed in outwash that was derived from gray sandstone and siltstone. On uplands the soils adjacent to Tunkhannock soils are the Lordstown, Mardin, Volusia, and Chippewa, which developed in gray, acid glacial till, and the Oquaga, Cattaraugus, Culvers, Morris, and Norwich, which developed in red, acid glacial till. The adjacent soils on flood plains are mainly the Barbour and Tioga. In places the Tunkhannock soils are near the finer textured Schoharie, Odessa, and Lakemont soils.

A profile of Tunkhannock soils commonly has a plow layer of brown to dark-brown, very friable gravelly silt loam about 4 to 8 inches thick. The upper part of the subsoil is reddish-brown, friable gravelly silt loam 4 or 5 inches thick; the lower part is yellowish-red, friable silt loam that extends to a depth of 20 to 30 inches. The substratum is glacial outwash consisting of stratified sand and gravel.

The surface layer and upper part of the subsoil range from gravelly silt loam to cobbly sandy loam. Most commonly they are gravelly, but in some places they are free of gravel and in others they are channery. In some hilly areas the material in the substratum is poorly sorted.

Tunkhannock soils dry and warm rapidly in spring. Free water seldom is within 30 inches of the surface, except for short periods after heavy rains in spring. The water-holding capacity of these soils is moderate to low, and plants on them are affected by drought after 10 to 14 days without rain. Steep soils and the coarser textured cobbly soils are droughty.

Tunkhannock soils are strongly acid or medium acid and have low fertility. Large applications of lime are needed. The supply of nitrogen, phosphorus, and potassium is low, and additions of these nutrients are needed for good growth of crops.

Tunkhannock and Chenango gravelly loams, fans, 0 to 5 percent slopes (TcA).—The soils in this group are on fans in valleys where streams have deposited material that has been washed from the uplands. Some areas are made up of only the Tunkhannock soil, other areas of only the Chenango soil, and still others of both of these soils. Except for texture of the surface layer, each soil has a profile similar to the one described as typical for its respective series. These fans generally slope toward the middle of the valley. The thickness of the deposits varies widely. Near the base of the uplands the deposits generally are deep and coarse textured, and at the edge of the fans they are 2 to 5 feet thick. The soils on the edge of the fans are finer textured than is typical for Tunkhannock and Chenango soils. The wetter Red Hook soils commonly are near the lower edge and at the sides of these fans.

The soils of this group are suited to crops, pasture, and trees. Where the surface is not too channery or cobbly, the soils are suited to cultivated crops. In some places erosion on streambanks is serious. These soils are well suited as sites for buildings and for other nonfarm uses. They are not a good source for gravel. (Capability unit I–1; woodland suitability group 2)

Tunkhannock and Chenango gravelly loams, fans, 5 to 15 percent slopes (TcC).—The soils in this group are on fans in valleys where streams have deposited material that has been washed from the uplands. Some areas are made up of only the Tunkhannock soil, other areas of only the Chenango soil, and still others of both of these soils. Except for texture of the surface layer, each soil has a profile similar to the one described as typical for its respective series. The thickness and texture of these deposits vary widely. They are deeper and coarser textured near the base of the uplands and become thinner and finer textured toward the lower edge and at the sides. Near the border of the valley floor the deposits are only 2 to 5 feet thick, and the soils are wetter than typical for Tunkhannock and Chenango soils. The wetter Red Hook soils commonly are near the lower edge and at the sides of these fans.

The soils in this group are suited to crops, pasture, and trees. The supply of lime and plant nutrients is low, and large additions of these amendments are needed for good growth of plants. In places erosion is serious on streambanks, and special practices are needed to control it. Erosion is also a hazard on the steeper slopes. Except on the steeper slopes, these soils are well suited as sites for buildings. (Capability unit IIIe–2; woodland suitability group 2)

Tunkhannock and Chenango gravelly silt loams, 0 to 5 percent simple slopes (ThA).—The soils in this group are nearly level or gently sloping and most commonly are on terraces of glacial outwash. Some areas are made up of only the Tunkhannock soil, other areas of only the Chenango soil, and still others of both of these soils. Each has a profile similar to the one described as typical for its respective series.

Included with this group are small areas of somewhat poorly drained Red Hook soils.

The soils in this group are well suited to crops, pasture, or trees. They are also adapted to many kinds of special crops, including fruit, vegetables, and deep-rooted legumes. The supply of lime and plant nutrients is low, and large additions of these amendments are needed for good growth of crops. Erosion is of little or no significance, and drainage generally is needed only in small wet spots. (Capability unit I–1; woodland suitability group 2)

Tunkhannock and Chenango gravelly silt loams, 5 to 15 percent simple slopes (ThC).—The soils in this group are on glacial outwash plains. Only soils that have smooth slopes are mapped in this group. The Tunkhannock soil is dominant, but some areas are made up of only the Tunkhannock soil, other areas of only the Chenango soil, and still other areas of both of these soils. Each of these soils has a profile similar to the one described as typical for its respective series.

Included with this group are small areas of somewhat poorly drained Red Hook soils in depressions and along the margin of terraces.

The soils in this group are suited to crops, pasture, or trees. The hazard of erosion is moderate to high, and careful management is needed where row crops are grown. The water-holding capacity is moderate to low, and the growth of crops is limited in dry years. These soils are well suited as sites for houses, for recreation, and for other nonfarm

uses. They are also a good source of gravel. (Capability unit IIIe–2; woodland suitability group 2)

Tunkhannock and Chenango gravelly silt loams, 3 to 15 percent complex slopes (ThCK).—The soils in this group are on undulating gravelly deposits of the uplands, on valley trains in narrow valleys, and on glacial outwash plains that are highly dissected. Only soils that have complex slopes are mapped in this group. Some areas are made up of only the Tunkhannock soil, other areas of only the Chenango soil, and still others of both of these soils. Each soil has a profile similar to the one described as typical for its respective series. In many places these soils formed in poorly stratified gravelly deposits and contain more cobblestones than the Tunkhannock and Chenango soils that have smooth slopes.

Included with this group are small areas of Red Hook soils in small depressions between hillocks.

The soils in this group are suited to crops, pasture, and trees. The steeper areas are not well suited to row crops. Controlling erosion on the complex slopes is a serious concern of management. (Capability unit IIIe–2; woodland suitability group 2)

Tunkhannock and Chenango gravelly silt loams, 15 to 25 percent slopes (ThD).—The soils in this group are on terrace breaks, on gravelly deposits on the sides of valleys, and in gravelly areas in both valleys and uplands. Some areas are made up of only the Tunkhannock soil, other areas of only the Chenango soil, and still others of both of these soils. Each has a profile similar to the one described as typical for its respective series. Some areas have little or no erosion, and others have severe erosion. Most areas that have been cleared and tilled are moderately or severely eroded. In many places these soils formed in poorly stratified, gravelly deposits and have a cobbly or channery surface layer.

Included with this group are small areas of Red Hook soils.

Although the soils in this group can be used for crops, steepness and the complexity of slopes make the use of farm machinery both difficult and hazardous. The hazard of erosion is high while the soils are bare during preparation for seeding. Several years of hay and improved pasture are better uses than crops, but lime and fertilizer are needed. Trees are an excellent use for these soils, as red pine and other trees grow rapidly. Slope is limiting for many nonfarm uses, but the soils are generally a good source of gravel. (Capability unit IVe–8; woodland suitability group 2)

Tunkhannock and Chenango soils, non-stratified, 3 to 15 percent slopes (TkC).—The soils in this group are mainly on hilly deposits of gravel in the uplands. Some areas are made up of only the Tunkhannock soils, other areas of only the Chenango soils, and still other areas of both kinds of soils. Except that the soil material is not well stratified, each soil has a profile that is similar in most respects to the one described as typical for its respective series. The deposits in which these soils formed consist of a random mixture of sand and gravel of variable grain size, whereas deposits in which other Tunkhannock and Chenango soils formed consist of layers of sand and gravel in which grain size is more nearly uniform.

Included with this group are small areas of somewhat poorly drained Red Hook soils.

The soils in this group are suited to crops, pasture, or trees. Row crops can be grown where the surface layer is not too cobbly or channery. In most places, however, tillage is difficult because of coarse fragments or steep or complex slopes. Erosion is of moderate concern, but it can be controlled in most places by adjusting the cropping system. These soils tend to be droughty. Pine trees, particularly red pine, grow well on these soils, and the soils provide good sites for houses. (Capability unit IIIe–2; woodland suitability group 2)

Tunkhannock and Chenango soils, non-stratified, 15 to 35 percent slopes (TkD).—The soils in this group are mainly on steep, hilly deposits of poorly sorted gravel. Some areas are made up of only the Tunkhannock soils, other areas of only the Chenango soils, and still others of both kinds of soils. Except that the material is less well stratified and contains more coarse fragments, each soil has a profile that is similar in most respects to the one described as typical for its respective series. Small areas of Red Hook soils are included.

Growing cultivated crops on the soils in this group is not practical, because slopes are steep and complex and fragments in the surface layer are coarse. Several years of hay or pasture is a better use, but large additions of lime and fertilizer are needed for good growth. Also, these soils are droughty. Trees, particularly red pine and other conifers, are well suited. (Capability unit IVe–8; woodland suitability group 2)

Tunkhannock and Chenango soils, 25 to 60 percent slopes (TnF).—The soils in this group occur mainly as steep escarpments of terraces, but also as steep gravelly deposits on the sides of valleys and on steep gravelly knolls. Some areas are made up of only Tunkhannock soils, other areas of only Chenango soils, and still others of both kinds of soils. Except that the material in places is less well stratified and contains cobblestones in the surface layer, each soil has a profile that is similar in most respects to the one described as typical for its respective series. Where these soils have been cleared, they are severely eroded.

Included with this group are small areas of Howard soils. Also included, on the steep sides of valleys where bedrock is near the surface, are small areas of Lordstown soils.

The soils in this group are not suited to farming. In places they provide limited grazing, but plant growth is poor unless lime and fertilizer are added. These soils are droughty in summer, and grazing is limited to early in spring and late in fall. These soils are suited to trees and as wildlife habitat. Use of farm machinery on these steep soils is impractical and dangerous. Where the native vegetation is removed, these soils are extremely susceptible to erosion. (Capability unit VIIe–1; woodland suitability group not assigned)

Tunkhannock cobbly sandy loam, 0 to 5 percent slopes (TuA).—This soil is on outwash terraces and on alluvial terraces along fast-flowing streams. Except that it has coarser texture and many cobblestones in the surface layer, this soil has a profile similar to the one described as typical for the Tunkhannock series.

Included with this soil in mapping are small areas of Tunkhannock gravelly silt loam.

Cultivated crops can be grown on this Tunkhannock soil, but cobblestones in the surface layer make tillage difficult or, in some places, impractical. Large additions of lime and fertilizer are needed for hay and pasture crops.

Because this soil is droughty, pasture on it is poor during midsummer. This soil is suited to trees. Red pine is especially well adapted and grows rapidly. Sheet erosion is not a problem, but streambank erosion occurs in places and special practices are needed for its control. This soil is suitable for houses and similar nonfarm uses. (Capability unit IIs–2; woodland suitability group 2)

Volusia Series

In the Volusia series are deep, somewhat poorly drained, nearly level to steep soils that have uniform slopes. These soils are in the high plateau area of the southern part of the county. They formed in firm, acid, grayish-brown glacial till. At a depth of 10 to 18 inches is a dense fragipan that restricts penetration by roots and water. These soils are wet because they either have slow runoff or receive runoff from nearby higher lying soils.

The Volusia soils are near or closely intermingled with the well drained and moderately well drained Mardin soils. Also nearby in seeps and basins are the wet and very wet Chippewa soils.

A profile of Volusia soils commonly has a plow layer of very dark grayish-brown, friable channery silt foam 6 to 8 inches thick. The upper part of the subsoil is mottled, dark yellowish-brown, friable channery loam 2 to 8 inches thick. The lower part consists of a thin, distinctly mottled, light olive-gray, leached layer of firm channery loam that extends to a depth of 10 to 18 inches and of a very firm, dense, mottled grayish-brown to olive-brown fragipan of channery loam. The fragipan is slowly permeable and extends to a depth of 4 or 5 feet. The substratum is dense, dark grayish-brown channery loam glacial till.

Early in spring the Volusia soils are saturated with water within a few inches of the surface and are wet and cold. In most places these soils cannot be plowed before the middle of May or early in June. By then, the surface layer generally has dried and can be plowed except for a few days after heavy rains. The moisture-holding capacity is low. Because roots can get water from only the zone above the fragipan, plant growth is limited during dry periods in summer.

The Volusia soils are strongly acid, and lime is needed for good growth of forage crops. The supply of nitrogen is moderate, but nitrogen is only slowly available to plants. Additions of phosphorus and potassium are needed for good growth of most crops.

Volusia channery silt loam, 0 to 3 percent slopes (VcA).—This soil occupies moderately large flats or is very gently sloping in areas at the base of long, smooth hills. The plow layer of this soil generally is darker colored and richer in organic matter than that in steeper Volusia soils. On the average, depth to the fragipan is 12 to 14 inches. This is one of the wetter Volusia soils.

Included with this soil in small, shallow depressions and long, narrow drainageways are Chippewa soils. Also included are small areas of the better drained Mardin soils.

This soil is suited to crops, pasture, or trees. Cultivation is limited in undrained areas, and only plants that tolerate wetness grow well. Wetness prevents the use of heavy machinery on this soil early in spring and after heavy rains in fall.

Although the content of organic matter and nitrogen is higher in this soil than in the drier Volusia soils, plants respond to additional nitrogen and grow well. They also need additions of lime, phosphorus, and potassium, even for moderate growth of crops. Seasonal wetness and shallowness to the fragipan are the main limitations to nonfarm uses. (Capability unit IIIw–2; woodland suitability group 7)

Volusia channery silt loam, 3 to 8 percent slopes (VcB).—This soil is on long, smooth, and slightly convex slopes. It has a profile similar to the one described as typical for the Volusia series. Included with this soil are Mardin soils on small slightly convex knolls and Chippewa soils in seeps.

This soil is suited to crops, pasture, and trees, but it is cold and wet early in spring and corn, small grains, hay, and similar crops do not grow well. Erosion is a hazard in the more sloping areas. Seasonal wetness and shallowness to the fragipan are the main limitations to nonfarm uses. (Capability unit IIIw–4; woodland suitability group 7)

Volusia channery silt loam, 8 to 15 percent slopes (VcC).—Most areas of this soil are uneroded or are only slightly eroded, and some areas are severely eroded. In eroded areas the plow layer is directly above the fragipan and is lighter in color and lower in organic-matter content than the plow layer in uneroded areas. This soil receives additional water, either as runoff or seepage, from adjacent higher lying soils.

In the uplands this soil is near the Arnot, Lordstown, and Mardin soils. Included with this soil are Chippewa soils commonly in seeps and Mardin soils in small steeper areas.

This soil can be used for crops, pasture, or trees. Wetness and the hazard of erosion limit its use for crops. Wetness and shallowness to the fragipan are the main limitations to use as building sites or recreational areas. (Capability unit IIIe–11; woodland suitability group 7)

Volusia, Morris and Erie very stony soils, 0 to 15 percent slopes (VmC).—The soils of this group are somewhat poorly drained, strongly acid, and very stony. Each soil has a profile similar to the one described as typical for its respective series. Slopes generally are long and smooth, but they are cut by drainage channels.

Included with this group are small areas of Chippewa and Norwich soils in seeps and drainageways. On convex knolls are the better drained Mardin, Culvers, or Langford soils.

The soils in this group are too stony for cultivated crops or the use of farm machinery (fig. 6). They have limited use as unimproved pasture, and they are suited to trees and wildlife habitat. Where they are used for trees, wetness limits the choice of species. These soils are poorly suited to many nonfarm uses. (Capability unit VIIs–2; woodland suitability group 7)

Wayland Series

In the Wayland series are deep, poorly drained, nearly level soils in low areas of bottom lands along Cobleskill, West, and Fox Creeks and along the small streams that flow from areas of high-lime soils. These soils formed in slightly acid to neutral recent alluvium.

The Wayland soils are near the well drained Tioga, the moderately well drained Middlebury, and the very poorly drained Papakating soils on bottom lands. They

Figure 6.—**Stones on the surface of Morris soils prevent cultivation.**

are also near the Hudson, Howard, Mohawk, and Honeoye soils.

A profile of Wayland soils commonly has a plow layer of very dark grayish-brown, friable silt loam 4 to 10 inches thick that is rich in organic matter. The next layer is mottled dark grayish-brown to dark-gray, friable silt loam and loam that extends to a depth of 20 inches or more. Below this layer is gray mottled material that generally consists of stratified sand, silt, and gravel.

The surface layer of Wayland soils is free of stones and gravel. Texture of the subsoil and substratum is mainly silt loam, but it ranges from gravelly loam to silty clay loam. In some places layers of coarse gravelly alluvium occur within 30 inches of the surface. These soils are slightly acid in the upper part and are neutral in the lower part.

Most areas of Wayland soils are flooded for short periods early in spring. During April the water table is within 6 inches of the surface, and some areas are ponded after heavy rains. Late in spring or early in summer the water table drops below a depth of 12 inches. Even then, unless the soils are drained, they will not support farm machinery and are too wet for many crops. In undrained areas most roots are restricted to the upper 12 to 16 inches. Free water is at a fairly shallow depth most of the time; consequently, the water-holding capacity of these soils has little meaning.

The content of organic matter and of nitrogen is high in Wayland soils. Decomposition of the organic matter is slow, however, and most of the nitrogen is not available to plants. These soils are only slightly acid in the surface layer, and lime is seldom needed.

Wayland silt loam (0 to 5 percent slopes) (Wa).—This nearly level soil is in low areas of the bottom lands along Cobleskill and West Creeks and in places along Fox Creek and the smaller streams that flow from the limestone areas of the county.

Included with this soil are small areas of the better drained Tioga and Middlebury soils.

Wetness and flooding are the main limitations to use of this soil for farming. Undrained areas are better suited to pasture or trees than to cultivated crops. The kinds of trees, grasses, and sedges that tolerate wetness dominate on this soil. Where suitable outlets are available, this soil can be improved by drainage and used for cultivated crops. Use for community developments and for most recreational purposes is limited by wetness and flooding. (Capability unit IVw-4; woodland suitability group not assigned)

Genesis, Morphology, and Classification of Soils

This section discusses the effects of the five major factors that affect the formation of soils in Schoharie County and briefly describes important processes that influence genesis of the soils. Also, the current system of soil classification is explained, and each soil series represented in the county is placed in some categories in that system and in the great soil group of an older system.

Formation of Soils

Soils are complex mixtures of weathered rocks, minerals, organic matter, water, and air that occur in varying proportions. The soils were formed through the chemical and physical weathering of the unconsolidated parent material as influenced by (1) the kind of climate; (2) living organisms, particularly vegetation; (3) relief, or lay of the land; and (4) the time these factors have affected development. In Schoharie County the local differences in the soils are mainly the result of differences in parent material and relief. This is because climate and vegetation are fairly uniform throughout the county, and most of the soil materials have been exposed to the soil-forming processes for about the same length of time.

Parent material

The soils in Schoharie County formed in mineral materials most of which were deposited as a result of glaciation during the Wisconsin age. These materials are (1) glacial till, (2) glacial outwash consisting of sorted sand and gravel, and (3) glacial lake-laid silt and clay. More recently, alluvium has been deposited in the valleys along streams. The mineral materials came mainly from acid to alkaline shale, sandstone, and limestone. In places soils are forming in decomposed and decomposing plant material that has accumulated in depressions.

As the glaciers moved over the county, they carried large quantities of rock, much of which was ground into fragments ranging from boulders to clay in size. Some of these materials later were deposited directly by the ice in a heterogeneous mass called glacial till. In Schoharie County, the Mardin, Cattaraugus, Mohawk, and Honeoye are examples of soils formed in glacial till.

As the glacial ice melted, enormous quantities of water ran off and carried and sorted the glacially transported material. This material was redeposited in layers of sand and gravel as outwash plains, kames, eskers, and deltas. The sand and gravel pits in the county are examples of these deposits. The Tunkhannock and Chenango soils formed in sandy and gravelly glacial outwash deposits.

Large quantities of finely ground rock were carried by meltwater and deposited in the quiet waters of glacial lakes and ponds. These particles were the size of silt and clay. Beds of silt and clay were left in many of these lakes and ponds when they were drained. The silts and clays in the valley of Schoharie Creek are in beds of this kind that were laid down in the large glacial lake that formed when the northern part of the valley was blocked by ice. The Schoharie and Hudson are examples of soils that formed in these lake-laid sediments.

In a few places, shallow ponds were created when the glacier receded. In these shallow waters, the remains of water-tolerant plants accumulated. Muck and peat soils are forming where these remains have accumulated.

After the ice disappeared and the surface of the area was exposed to the atmosphere, the soil-forming processes became active. The removal of glacial drift and redeposition by streams have continued, however, as the present streams build and alter their flood plains by dropping material in some places and washing it away in others. Much of the material on the bottom lands of rivers has been deposited so recently that there has been little change in characteristics other than depositional layerings. The Barbour and Tioga soils are in recent alluvial deposits.

Relief

The slope and shape of the land surface determine to a considerable extent the amount of water that enters and passes through the soil and the height of the water table. According to Norton and Smith (*11*), the most important effect of slope is its influence on the moisture content of the soil.

The amount of water that stands on or is contained in or moves through a soil affects the oxidation, breakdown, and the amount of removal of the soil minerals from the soil. The translocation of components is most noticeable in permeable materials through which water can move readily.

In depressions, where the water table is at or near the surface for long periods, the subsoil generally is dull gray. Where the water table is deep, bright colors of yellowish brown and reddish brown are common in the subsoil. On gentle to moderate slopes, where the water table fluctuates, mixtures of gray and yellowish brown are common.

Living organisms

The native vegetation in Schoharie County was originally forest. The trees consisted mainly of hardwoods, but there were lesser amounts of white pine and hemlock. The principal hardwoods were beech, maple, birch, ash, hickory, and some oak.

Most of the hardwood trees contain some calcium and other bases in their leaves. The soils became more acid, however, when nearly all the bases released from the decomposed leaves were leached from the soil.

Many of the soils in the county have been plowed and limed, and the undulations and mounds caused by tree throw have been smoothed. Liming and cultivating the soil have increased the base status and lowered the carbon-nitrogen ratio (*6*).

Liming and cultivating have also increased the earthworm population. Earthworms mix and incorporate organic matter from the surface of the soil down into the soil. Earthworm channels increase the permeability of the soil. Small rodents, insects, and burrowing animals also mix soil materials, and roots increase soil permeability. Bacteria and fungi break down the organic matter in the soil into simpler compounds.

Climate

The climate of Schoharie County is cool, humid, and continental, though it is tempered somewhat by oceanic influences. Winters are long and cold. Summers are short and mild. The average annual precipitation of 40 inches is fairly evenly distributed throughout the year. Detailed information on climate is given in the section "General Nature of the County."

Climate affects soil formation through its influence on chemical, physical, and biological processes. The larger the amount of water passing through the soil the more its chemical composition is altered. Leaching of soluble materials depends largely on the amount of rainfall. Freezing, thawing, and diurnal differences in temperature affect the physical weathering of rocks and soils. Temperature also affects biological activity. Decomposition of organic matter increases as the mean annual temperature increases. Climate throughout Schoharie County is fairly uniform and differences in soils in the county are not directly attributed to differences in climate.

Time

Geologically, the soil materials of Schoharie County are young. The last glacier receded from the county about 10,000 to 15,000 years ago. Because climate and vegetation have changed within the last 10,000 to 15,000 years, the soils today may differ from those that first developed.

Soils develop rapidly in their youth. In young soils plant nutrients are quickly released from the minerals, plant growth increases, and organic matter accumulates. Water leaches many of the soluble compounds from soils. Many soils are now acid because the limestone originally present has been leached from them. In some permeable soils fine clay particles have moved down from the surface layer and have accumulated in the subsoil. Thus, as soils age, breakdown of soil materials continue. Soil processes, however, reach a state of near equilibrium with their environment and, after a long period of exposure to a given set of conditions, the relative rates of processes may change but little during hundreds or even thousands of years unless there is a change in the environment.

The soils in Schoharie County are relatively young. Most of the limestone has been leached from the upper layers of the upland soils. Some upland soils, especially those in the northern part of the county, have had some clay accumulation in the lower layers. Upland soils have distinct horizonation caused by transformations of the original materials. The soils on the river bottoms are very young, and some of them do not show horizon differences that are the result of soil-forming processes.

Morphology of Soils

If a vertical cut is made in a soil, several layers, or horizons, are evident. The differentiation of horizons is the result of many soil forming processes. The most important of these are the following: (1) Physical breakdown of particles, (2) leaching of salts that are more or less soluble, (3) accumulation of organic matter, (4) chemical weathering of primary minerals and the formation of silicate clay minerals, (5) translocation of silicate clay minerals from one horizon to another by percolating water, (6) accumulation of some iron colloids, and (7) formation of dense or compact layers in the subsoil.

Some of these processes take place in all the soils, but the number of active processes and the degree of their activity vary from one soil to another.

In all of the mineral soils, some organic matter has accumulated to form an A1 horizon. In wooded areas these mineral soils have an organic horizon at the surface, and this is designated as an O1 or O2 horizon, depending on the extent to which the organic material has decomposed. If the soils are cleared and plowed, their organic and A1 horizons lose their identity as they are mixed into the plow layer, which is called an Ap horizon. This horizon is enriched in organic matter and generally is distinct from the underlying horizons because it is darker and more friable. The Lyons soils are examples of soils that have a distinctive, dark-colored Ap horizon. Only in soils developing in very recent alluvium is there no sharp contrast between the A1, or the Ap, horizon and the next underlying horizon.

The upper horizons of a soil normally are more leached of bases and silicate clays than the lower horizons. The leached part of the A horizon that is too far below the surface to be influenced by surface organic matter is called the A2 horizon. Normally, it is the lightest colored horizon in the soil. It is well expressed in the Lansing and similar soils.

In some soils, the clays removed from the A horizon are accumulated in the subsoil in a horizon designated as the B2t horizon. Of all the horizons in the soil, this one contains the highest concentration of translocated clay. The Conesus soils have a well-expressed B2t horizon.

The subsoil of some soils includes a distinct zone of yellowish brown that differs little in texture from the A horizon. This zone is called a color B horizon. In this county Scio soils have a strong color B horizon.

Characteristics that indicate relative wetness, or class of drainage, are evident in soils. Excess water commonly produces mottles, or a pattern of colors, dominantly gray. The extent of mottling indicates the degree of gleying, or the process of chemical reduction and transfer of iron. Gleyed soil material normally is gray or bluish gray.

In soils that are well aerated, brown or yellowish brown is the normal color of the subsoil. A soil is considered well drained if it is free of mottles to a depth of at least 20 inches and shows only brown colors, such as the Honeoye. Ordinarily, moderately well drained soils are wet for short periods but are free of mottles to a depth of 16 to 20 inches. If the soils have a temporary perched water table, however, the A2 horizon contains a few mottles, though the upper part of the B horizon is essentially free of mottles. The Scio soils are examples of moderately well drained soils.

In areas where the soils are wet for long periods of time and are considered poorly drained, the A2 horizon shows the effect of moderate or intense reduction of iron. This horizon is dominantly gray but contains a few brown mottles. Within some areas of poorly drained soils, there are

small depressions that remain saturated most of the year unless they are artificially drained. Here, drainage is very poor, the surface layer has a high organic-matter content, and the soils are termed mucky. The Ilion and Papakating are examples of poorly drained and very poorly drained soils.

Classification of Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationships to one another and to the whole environment, and to develop principles that help us in understanding their behavior and their response to manipulation. First through classification and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

Thus in classification, soils are placed in narrow classes that are used in detailed soil surveys so that knowledge about the soils can be organized and used in managing farms, fields, and woodland; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*3*) and later revised (*14*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965. The current system is under continual study. Therefore, readers interested in developments of the current system should search the latest literature available (*12, 16*). In table 9, the soil series of Schoharie County are placed in some categories of the current system and in the great soil groups and orders of the older system. Placement of some soil series in the current system of classification may change as more precise information becomes available.

The current system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. In this system the criteria used as a basis for classification are soil properties that are observable and measurable. The properties are chosen, however, so that the soils of similar genesis, or mode of origin, are grouped together. The classes that make up the current system are briefly defined in the following paragraphs.

ORDER: Ten soil orders are recognized in the current system. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate the soil orders are those that tend to give broad climatic groupings of soils. Two exceptions, Entisols and Histosols, occur in many different climates. Table 9 shows the two soil orders in Schoharie County—Alfisols and Inceptisols.

SUBORDER: Each order is divided into suborders, primarily on the basis of those soil characteristics that seem to produce classes having the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders mainly reflect either the presence or absence of waterlogging or soil differences resulting from the climate or vegetation. The suborder is not shown in table 9.

GREAT GROUP: Soil suborders are separated into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons used to make separations are those in which clay, iron, or humus has accumulated or those that have pans interfering with growth of roots or movement of water. The features used are the self-mulching properties of clays, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), and the like. The great group is not shown separately in table 9, because the name of the great group is the last word in the name of the subgroup.

SUBGROUP: Great groups are divided into subgroups, one representing the central (typic) segment of the group and others, called intergrades, that have properties of the named great group and also one or more properties of another great group, suborder, or order. Subgroups may also be set up to include those having soil properties that intergrade outside of the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group.

FAMILY: Families are separated within a subgroup primarily on the basis of properties important to the growth of plants or behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence.

SERIES: The series consists of a group of soils that formed from a particular kind of parent material and having genetic horizons that, except for texture of the surface soil, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, structure, reaction, consistence, and mineralogical and chemical composition.

New soil series must be established and concepts of some established series, especially older ones that have been used little in recent years, must be revised in the course of the soil survey program across the country. A proposed new series has tentative status until review of the series concept at State, regional, and national levels of responsibility for soil classification results in a judgment that the new series should be established. All but one of the soil series described in this survey have been established earlier. The Appleton series had tentative status when this survey was sent to the printer.

Descriptions of the soil series

This subsection describes each soil series in the county and the profile of a soil representative of the series. The section "Descriptions of the Soils" also describes the soil series, but in language that is easier for the layman to understand. Also included is a description of each mapping unit, including the land types in the county. These mapping units are shown on the large soil map.

ALLIS SERIES

The Allis series consists of somewhat poorly drained and poorly drained soils that have a moderately fine and fine textured subsoil. These soils developed from thin deposits of acid glacial till that was derived from gray shale.

The Allis soils are similar in drainage to the Volusia and Chippewa soils but have finer texture, lack a fragipan, and are commonly more shallow over shale bedrock. Allis

TABLE 9—*Soil series classified according to the current system of classification* [1] *and the 1938 system with later revisions*

Series	Current classification			1938 classification
	Family	Subgroup	Order	Great soil group
Allis	Fine, illitic, acid, mesic	Aeric Haplaquepts	Inceptisols	Low-Humic Gley soils.
Appleton	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils.
Arnot	Loamy-skeletal, mixed, mesic	Lithic Dystrochrepts	Inceptisols	Sols Bruns Acides.
Barbour	Coarse-loamy over sandy or sandy-skeletal, mixed, mesic.	Fluventic Dystrochrepts	Inceptisols	Alluvial soils intergrading to Sols Bruns Acides.
Basher	Coarse-loamy, mixed, mesic	Aquic Fluventic Dystrochrepts.	Inceptisols	Alluvial soils intergrading to Sols Bruns Acides.
Burdett	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils.
Cattaraugus	Coarse-loamy, mixed, mesic	Typic Fragiochrepts	Inceptisols	Sols Bruns Acides.
Chenango	Loamy-skeletal, mixed, mesic	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides.
Chippewa	Fine-loamy, mixed, mesic	Typic Fragiaquepts	Inceptisols	Low-Humic Gley soils.
Conesus	Fine-loamy, mixed, mesic	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Culvers	Coarse-loamy, mixed, mesic	Typic Fragiochrepts	Inceptisols	Sols Bruns Acides.
Darien	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils.
Erie	Fine-loamy, mixed, mesic	Aeric Fragiaquepts	Inceptisols	Sols Bruns Acides.
Farmington	Loamy, mixed, mesic	Lithic Eutrochrepts	Inceptisols	Sols Bruns Acides intergrading to Brown Forest soils.
Fredon	Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid, mesic.	Aeric Haplaquepts	Inceptisols	Low-Humic Gley soils intergrading to Brown Forest soils.
Halsey	Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid, mesic.	Mollic Haplaquepts	Inceptisols	Low-Humic Gley soils intergrading to Humic Gley soils.
Holly	Fine-silty, mixed, nonacid, mesic	Fluventic Haplaquepts	Inceptisols	Low-Humic Gley soils.
Honeoye	Fine-loamy, mixed, mesic	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Howard	Loamy-skeletal, mixed, mesic	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Hudson	Fine, illitic, mesic	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Ilion	Fine-loamy, mixed, mesic	Mollic Ochraqualfs	Alfisols	Low-Humic Gley soils.
Lakemont	Fine, illitic, mesic	Udollic Ochraqualfs	Alfisols	Low-Humic Gley soils.
Langford	Fine-loamy, mixed, mesic	Typic Fragiochrepts	Inceptisols	Sols Bruns Acides.
Lansing	Fine-loamy, mixed, mesic	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Lima	Fine-loamy, mixed, mesic	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Lordstown	Coarse-loamy, mixed, mesic	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides.
Lyons	Fine-loamy, mixed, nonacid, mesic	Mollic Haplaquepts	Inceptisols	Low-Humic Gley soils intergrading to Humic Gley soils.
Madalin	Fine, illitic, mesic	Mollic Ochraqualfs	Alfisols	Humic Gley soils.
Mardin	Fine-loamy, mixed, mesic	Typic Fragiochrepts	Inceptisols	Sols Bruns Acides.
Middlebury	Coarse-loamy, mixed, mesic	Aquic Fluventic Eutrochrepts.	Inceptisols	Alluvial soils.
Mohawk	Fine-loamy, mixed, mesic	Mollic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading to Brown Forest soils.
Morris	Coarse-loamy, mixed, mesic	Aeric Fragiaquepts	Inceptisols	Sols Bruns Acides.
Nassau	Loamy-skeletal, mixed, mesic	Lithic Dystrochrepts	Inceptisols	Sols Bruns Acides.
Norwich	Fine-loamy, mixed, mesic	Typic Fragiaquepts	Inceptisols	Low-Humic Gley soils intergrading to Humic Gley soils.
Nunda	Fine-loamy, mixed, mesic	Glossaquic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Odessa	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils.
Oquaga	Loamy-skeletal, mixed, mesic	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides.
Papakating	Fine-silty, mixed, nonacid, mesic	Fluventic Haplaquepts	Inceptisols	Humic Gley soils.
Phelps	Fine-loamy, mixed, mesic	Glossaquic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading to Brown Forest soils.
Red Hook	Coarse-loamy, mixed, acid, mesic	Aeric Haplaquepts	Inceptisols	Sols Bruns Acides.
Rhinebeck	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils.
Schoharie	Fine, illitic, mesic	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Scio	Coarse-silty, mixed, mesic	Aquic Dystrochrepts	Inceptisols	Sols Bruns Acides.
Tioga	Coarse-loamy, mixed, mesic	Dystric Fluventic Eutrochrepts.	Inceptisols	Alluvial soils.
Tuller	Loamy, mixed, acid, mesic	Lithic Haplaquepts	Inceptisols	Low-Humic Gley soils.
Tunkhannock	Loamy-skeletal, mixed, mesic	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides.
Volusia	Fine-loamy, mixed, mesic	Aeric Fragiaquepts	Inceptisols	Sols Bruns Acides.
Wayland	Fine-silty, mixed, nonacid, mesic	Fluventic Haplaquepts	Inceptisols	Low-Humic Gley soils.

[1] Placement of some soil series in the current system of classification, particularly in families, may change as more information becomes available.

soils have a higher content of clay in the B horizon than have the Tuller soils. Better drained associates of the Allis soils are the Lordstown, Nassau, and Oquaga soils.

Allis soils occur in slight depressions and shallow basins in shale bedrock on the flat tops of upland plateaus. The native vegetation consists of hardwoods and locally of hemlock and white pine.

Typical profile of an Allis silt loam on a slope of 3 percent (in a hayfield):

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular and moderate, fine and medium, subangular blocky structure; friable when moist, nonsticky and slightly plastic when wet; abundant fine roots; many fine pores; medium acid; abrupt, smooth boundary. Horizon is 7 to 8 inches thick.

A2—8 to 12 inches, pale-brown (10YR 6/3) silt loam that has common, medium, faint mottles of brownish yellow (10YR 6/6); weak, thin and medium, platy structure; friable when moist, nonsticky and slightly plastic when wet; abundant fine roots; many fine pores; very strongly acid; abrupt, wavy boundary. Horizon is 2 to 6 inches thick.

IIB2g—12 to 24 inches, shaly silty clay that has thin continuous coats of gray (5Y 5/1) clay on ped surfaces and in pores; ped interiors are dark gray (5YR 4/1) and have common, medium, prominent mottles of strong brown (7.5YR 5/8); strong, medium and coarse, angular blocky structure; firm when moist, slightly sticky and plastic when wet; few fine roots; common fine pores; very strongly acid; abrupt, smooth boundary. Horizon is 10 to 14 inches thick.

R—24 inches +, dark shale bedrock.

Color of the surface layer ranges from dark grayish brown (10YR 4/2) in the better drained areas to black (10YR 2/1) in the poorer drained areas. In unplowed areas the A1 horizon ranges from 1 inch to 3 inches in thickness.

The B horizon is shaly silty clay in most places, but it is shaly silty clay loam in some places. Depth to shale bedrock is 20 to 40 inches.

Structure ranges from moderate, fine, granular to moderate, fine and medium, subangular blocky in the surface layer to moderate and strong, medium and coarse, angular blocky in the subsoil.

Consistence ranges from friable when moist and slightly sticky and slightly plastic when wet in the surface layer to firm when moist and very sticky and very plastic when wet in the subsoil.

Reaction ranges from pH 5.8 in the surface layer to pH 5.0 in the subsoil. Depth to mottling ranges from 5 to 15 inches.

APPLETON SERIES

The Appleton series consists of somewhat poorly drained soils that developed on highly calcareous Wisconsin till containing a considerable amount of limestone, shale, and sandstone.

These soils are in a drainage sequence with the well drained Honeoye and Lansing soils, the moderately well drained Lima and Conesus soils, and the poorly drained and very poorly drained Lyons soils. Appleton soils are similar to the Darien and Burdett soils but are coarser textured and have a less well developed B horizon.

Appleton soils are nearly level to gently sloping and occur on uplands in the northern part of the county. Slightly concave slopes of 2 to 8 percent are common. The native vegetation consists of red maple, elm, willow, and white-cedar.

Typical profile of an Appleton channery silt loam on slopes of 5 to 8 percent (in a hayfield):

Ap1—0 to 4 inches, dark grayish-brown (10YR 4/2) channery silt loam, pale brown (10YR 6/3) when dry; moderate, medium, granular structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many fine pores; slightly acid; abrupt, smooth boundary. Horizon is 2 to 4 inches thick.

Ap2—4 to 8 inches, dark grayish-brown (10YR 4/2) channery silt loam; moderate to strong, very fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; abundant very fine and fine roots; many very fine pores; neutral; abrupt, smooth boundary. Horizon is 3 to 5 inches thick.

A2—8 to 13 inches, brown (10YR 5/3) channery silt loam that has common, fine, distinct mottles of yellowish brown (10YR 5/6); moderate; medium, platy structure; friable when moist, slightly sticky and slightly plastic when wet; many very fine roots; many very fine and fine pores; neutral; clear, wavy boundary. Horizon is 0 to 6 inches thick.

B1—13 to 16 inches, olive-brown (2.5Y 4/4) and pale-brown (10YR 6/3) channery loam that has common, fine, distinct mottles of yellowish brown (10YR 5/6); thin, patchy, dark-gray (10YR 4/1) clay films on ped faces; thin, continuous, dark-gray (10YR 4/1) films in pores; some peds have patches of bleached sand grains that interfinger from horizon above; weak and moderate, medium, angular blocky structure; firm when moist, slightly sticky and slightly plastic when wet; few fine roots; common, fine and medium pores; neutral; abrupt, wavy boundary. Horizon is 0 to 3 inches thick.

B2t—16 to 22 inches, olive-brown (2.5Y 4/3) channery silt loam that has common, fine, distinct mottles of yellowish brown (10YR 5/6); medium, continuous, dark-gray (2.5Y 4/1) clay films on ped faces and in pores; moderate, medium, angular blocky structures; firm when moist, slightly sticky and plastic when wet; no fine roots; common fine pores; neutral; abrupt, wavy boundary. Horizon is 5 to 8 inches thick.

C—22 to 26 inches +, olive-brown (2.5Y 4/4) channery loam that has common, fine, distinct mottles of grayish brown (10YR 5/2) and light gray or gray (10YR 6/1); thin, patchy, dark grayish-brown (10YR 4/2) clay films on horizontal faces of peds and in pores; weak, thick, platy structure; firm when moist, slightly sticky and slightly plastic when wet; common, very fine and fine pores; strong effervescence with cold, dilute hydrochloric acid.

The surface layer ranges from channery silt loam to silt loam in texture and from very dark grayish brown (10YR 3/2) to dark grayish brown (10YR 4/2) in color. In some places the surface layer has weak to moderate, very fine, subangular blocky structure.

The B2t horizon has a hue of 2.5Y, value of 4 or 5, and chroma of 3 or 4. It has common, fine and medium, distinct mottles. Texture of the B2t horizon ranges from channery loam to channery silt loam that has a content of clay ranging from 18 to 28 percent. Structure is mostly weak to moderate, angular blocky. Films of gray and dark gray are on most of the ped faces. In a few places the B2t horizon has weak, fine and very fine, subangular blocky structure. Consistence ranges from slightly firm to firm when moist and from slightly sticky and slightly plastic to plastic when wet.

The C horizon is olive brown (2.5Y 4/4) to light olive brown (2.5Y 5/4) and has common to many, fine and medium, faint and distinct mottles. It ranges from channery loam to channery silt loam in texture and generally has weak, medium or thick, platy structure. The C horizon is friable to firm when moist and nonsticky and slightly plastic to slightly sticky and plastic when wet. The solum is weakly calcareous or has a pH as low as 6.2. Depth to carbonates ranges from 18 to 30 inches.

ARNOT SERIES

In the Arnot series are strongly acid, shallow, well drained and moderately well drained soils formed in thin glacial till that was derived from gray and red sandstone, siltstone, and some shale. The sandstone and siltstone bedrock are at a depth ranging from 12 to 20 inches.

The Arnot soils occur closely with the moderately deep Lordstown and Oquaga soils and the shallow Nassau soils. Other closely associated soils are the somewhat

poorly drained, shallow Tuller and the deeper Mardin and Cattaraugus. Arnot soils are similar to Nassau soils but do not have such a high content of hard shale fragments. Arnot soils are also similar to the Farmington soils but are lower in base status and have fragments of sandstone and siltstone that Farmington soils lack. Sandstone and siltstone underlie Arnot soils, whereas limestone underlies Farmington soils. Arnot soils are the shallow analogs of the moderately deep Lordstown soils. They lack the drainage mottles below the plow layer that characterize the shallow, somewhat poorly drained Tuller soils.

Arnot soils are nearly level to moderately sloping. They occur on high plateaus that are mostly in the southern part of the county. The landscape is controlled by the bedrock. The native vegetation on Arnot soils consists of beech, sugar maple, hemlock, oak, and white pine.

Typical profile of Arnot flaggy silt loam, 0 to 15 percent slopes (in an idle field):

Ap—0 to 6 inches, very dark grayish-brown (10YR 3/2) flaggy silt loam; weak, medium and fine, granular structure; very friable when moist; abundant fine roots; many fine pores; strongly acid; abrupt, smooth boundary. Horizon is 4 to 9 inches thick.

B2—6 to 15 inches, dark yellowish-brown (10YR 4/4) flaggy silt loam; weak, medium, granular structure and weak, medium and fine, subangular blocky structure; very friable when moist; common fine roots; many fine pores; strongly acid; abrupt, smooth boundary. Horizon is 4 to 12 inches thick.

B3—15 to 16 inches, light olive-brown (2.5Y 5/4) flaggy silt loam that has few, fine, faint mottles of dark yellowish brown (10YR 4/4) and grayish brown (2.5Y 5/2); weak, thin, platy structure; friable when moist; common fine roots; many fine pores; strongly acid; abrupt, smooth boundary. Horizon is 0 to 3 inches thick.

R—16 inches +, gray siltstone bedrock; massive.

In undisturbed areas the Ap horizon is replaced by O1, O2, and A1 horizons. In most places the A1 horizon is black (10YR 2/1) and is 1 inch to 2 inches thick. In some places, a thin, light-gray A2 horizon occurs below the A1. Where plowed, the surface horizon has a hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3.

The B horizons have hues of 10YR and 2.5Y where they were derived from gray sandstone and shale. They have hues of 7.5YR and 5YR where they were influenced by red sandstone and shale. Values of 3 to 5 and chromas of 3 and 4 prevail. The mottled B3 horizon above the bedrock does not occur in some places.

Depth to bedrock ranges from 12 to 20 inches. In places the siltstone is thinly bedded, fractured, and interspersed with fine particles. The solum is silt loam and loam and is channery or flaggy in some places. In these places fragments of siltstone make up 20 to 50 percent of the solum, by volume. In reaction the solum ranges from very strongly acid to medium acid.

BARBOUR SERIES

The Barbour series consists of well-drained soils that developed from alluvium washed mainly from glaciated areas of red, acid sandstone and shale.

These soils are in the same drainage sequence as the moderately well drained Basher soils, the somewhat poorly drained or poorly drained Holly soils, and the very poorly drained Papakating soils. The Barbour soils are closely associated with the Tunkhannock soils, of glacio-fluvial origin, and with the Schoharie soils, of lacustrine origin. On adjacent uplands are Cattaraugus soils and their catenary associates. Barbour soils are similar to the Tioga soils but developed in reddish rather than in grayish alluvium.

The Barbour soils are in most of the valleys whose streams drain the red sandstone-shale areas of the Allegheny Plateau. They are on the stream terraces and flood plains and are level to nearly level. The native vegetation is forest consisting mainly of elm, maple, oak, and beech.

Typical profile of a Barbour loam on a slope of 1 percent (in cropland):

Ap—0 to 8 inches, brown to dark-brown (7.5YR 4/4) loam; weak, medium, platy and moderate, fine, granular structure; very friable when moist, slightly sticky and slightly plastic when wet; abundant fine and medium roots; many, fine and medium pores; abrupt, smooth boundary. Horizon is 6 to 8 inches thick.

B21—8 to 17 inches, brown to dark brown (7.5YR 4/4) loam; weak, thick, platy and weak, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; many fine roots; many fine pores and common medium pores; slightly acid; gradual, smooth boundary. Horizon is 9 to 20 inches thick.

B22—17 to 24 inches, reddish-brown (5YR 4/4) loam; weak, coarse, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; many fine roots; many fine pores; slightly acid; clear, smooth boundary. Horizon is 6 to 10 inches thick.

IIC1—24 to 42 inches, dark reddish-gray (5YR 4/2) loamy fine sand interbedded with 1- to 2-inch layers of reddish-brown (5YR 4/3) fine sandy loam that make up about 30 percent of the horizon, by volume; massive; very friable when moist, nonsticky and nonplastic when wet; very few fine roots; few fine pores; slightly acid; abrupt, wavy boundary. Horizon is 4 to 23 inches thick.

IIIC2—42 to 55 inches, dark grayish-brown (10YR 4/2) sand interbedded with ¼- to 1-inch lenses of reddish-brown (5YR 4/3) fine sandy loam that make up about 10 percent of the horizon, by volume; single grain; very friable when moist, nonsticky and nonplastic when wet; neutral. Horizon is 6 to 28 inches thick.

IVC3—55 to 65 inches +, alternating layers, 3 to 6 inches thick as in IIC and IIIC horizons.

The A horizon ranges from silt loam to fine sandy loam and in places is gravelly. Color of the A horizon ranges from brown (7.5YR 4/2) to dark brown (7.5YR 3/2). This horizon generally has moderate, thin and medium, platy structure, but in places it has weak, medium, platy structure. The A horizon is friable to very friable when moist and is slightly sticky to nonsticky and slightly plastic to nonplastic when wet.

The B horizon is generally loam, but in places it is silt loam or very fine sandy loam. Color ranges from dark brown (7.5YR 4/4) to reddish brown (5YR 4/4 and 4/3) to dark reddish brown (5YR 3/3). The B horizon has weak, fine, subangular blocky structure or weak, medium and thick, platy structure. It is friable or very friable when moist and, when wet, is nonsticky to slightly sticky and nonplastic to slightly plastic. In narrow valleys that have steeper slopes than the broad valleys, lenses of sand and gravel commonly occur in the B horizon.

Below the B horizon are strata of silt loam, loamy fine sand, sand, and gravelly sand that are brown to dark brown. These strata are either massive or single grain. They occur at a depth of 24 to 40 inches. Reaction of the solum ranges from strongly acid to slightly acid. Most of the Barbour soils in Schoharie County have higher reaction than those in other places.

BASHER SERIES

The Basher series consists of moderately well drained soils developed in alluvium that was transported by streams from the glaciated areas of red sandstone and shale of the Allegheny Plateau.

These soils are closely associated with the well-drained Barbour soils, which developed from the same kind of materials. Other associated soils are the poorly drained and somewhat poorly drained Holly and the very poorly drained Papakating soils. The Holly and Papakating soils are in the same catena as the well drained Tioga soils and

the moderately well drained Middlebury soils. The Basher soils are similar to the Middlebury soils but have a hue of 7.5YR or redder. Basher soils are adjacent to Schoharie and Tunkhannock soils, which are of glaciofluvial origin. On uplands near the Basher soils are the Cattaraugus soils and their associates.

Basher soils are nearly level to gently sloping and occur on flood plains, terraces, and gently sloping alluvial fans. The native vegetation is mainly elm, maple, beech, and red oak.

Typical profile of a Basher silt loam (in a hayfield):

Ap—0 to 11 inches, brown to dark-brown (7.5YR 4/2) silt loam; moderate, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine and very fine roots; neutral; abrupt, smooth boundary. Horizon is 6 to 11 inches thick.

B21—11 to 15 inches, reddish-brown (5YR 4/3) silt loam that has common, medium, faint mottles of greenish gray (5GY 6/1) and common, fine, distinct mottles of yellowish red (5YR 5/6); weak, coarse, prismatic structure breaking to moderate, thin and medium, platy structure; firm when moist, slightly sticky and slightly plastic when wet; common, fine and coarse pores and earthworm channels; few, thin, patchy linings in vertical and horizontal pores; common fine roots; neutral; abrupt, wavy boundary. Horizon is 4 to 8 inches thick.

B22—15 to 24 inches, brown to dark-brown (7.5YR 4/4 to 4/2) very fine sandy loam that has few, medium, distinct mottles of yellowish red (5YR 5/6); weak, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; fine and coarse pores and earthworm channels; few, thin, patchy linings of light-gray (10YR 6/1) silt or clay in pores; common fine roots; slightly acid; abrupt, wavy boundary. Horizon is 8 to 17 inches thick.

IIC1—24 to 26 inches, dark grayish-brown (2.5Y 4/2) medium sand that has common, medium, distinct mottles of yellowish brown (10YR 5/6); single grain; very friable when moist, nonsticky and nonplastic when wet; fine, medium, and coarse pores are common; slightly acid; abrupt, wavy boundary. Horizon is 2 to 4 inches thick.

IIIC2—26 to 30 inches +, brown to dark-brown (7.5YR 4/2) loamy fine sand that has common, medium and fine, distinct mottles of yellowish brown (10YR 5/6); massive; friable when moist, nonsticky and nonplastic when wet; common, medium and coarse pores; medium, continuous, light-gray (10YR 6/1) linings in pores; slightly acid.

Texture of the solum ranges from sandy loam to silt loam, but most commonly is silt loam. Color is mostly in hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 2 or 3. Mottling begins at a depth of 11 to 24 inches. Reaction ranges from strongly acid through slightly acid. Underlying the B horizon are strata of silt loam, loamy fine sand, sand, and gravelly sand that are brown to very dark brown. Most of the Basher soils in Schoharie County have higher reaction and are coarser textured in the substratum than Basher soils in other places.

BURDETT SERIES

The Burdett series consists of somewhat poorly drained bisequal soils that have a color B horizon in the upper part and a textural B horizon in the lower part of a typical profile. These soils developed in silty deposits over till dominated by dark-colored shale.

Burdett soils occur closely with the better drained Nunda soils, which developed in similar materials. They are also closely associated with the Darien soils, which do not have a thick color B horizon. Burdett soils are somewhat similar to the Erie and Volusia soils but have a higher content of dark-colored shale, lack a fragipan, and are less acid.

Burdett soils are gently sloping to sloping and occur in the low plateau region in the northern part of the county. They often receive runoff water from the adjoining, higher lying, better drained soils.

Typical profile of a Burdett channery silt loam on slopes of 10 percent (in an old meadow):

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) channery silt loam; weak, medium and fine, granular structure; very friable when moist, nonsticky and slightly plastic when wet; many fine roots; strongly acid; abrupt, smooth boundary. Horizon is 6 to 10 inches thick.

B2—9 to 16 inches, dark-brown (10YR 4/3) channery silt loam; common, fine, distinct mottles of yellowish brown (10YR 5/6) and faint mottles of dark yellowish brown (10YR 4/4); weak, fine, subangular blocky structure; friable when moist, nonsticky and slightly plastic when wet; common fine roots; strongly acid; clear, wavy boundary. Horizon is 4 to 10 inches thick.

A'2—16 to 20 inches, grayish-brown (2.5Y 5/2) channery silt loam; many, fine and medium, distinct mottles of dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6); weak, medium and fine, subangular blocky structure; firm when moist, nonsticky and slightly plastic when wet; common to few fine roots; strongly acid; abrupt, irregular boundary. Horizon is 4 inches thick.

IIB21t—20 to 31 inches, olive-gray (5Y 5/2) shaly silty clay loam; weak, coarse, subangular blocky structure; light olive-gray (5Y 6/2) silt coatings with few mottles on ped faces; interiors are gray (5Y 5/1) and have many, medium, prominent mottles of strong brown (7.5YR 5/6); firm when moist, slightly sticky and plastic when wet; few fine roots; slightly acid; clear, wavy boundary. Horizon is 8 to 12 inches thick.

IIB22t—31 to 40 inches, olive-gray (5Y 4/2) shaly silty clay loam; moderate, coarse, angular blocky structure; gray (5Y 5/1) clay films on ped surfaces; interiors are dark gray (5Y 4/1) and have many, medium and coarse, prominent mottles of dark yellowish brown (10YR 4/4); very firm when moist, plastic when wet; few pores with clay linings; few fine roots; slightly acid to neutral; gradual, wavy boundary. Horizon is 8 to 12 inches thick.

IIC—40 inches +, dark grayish-brown (2.5Y 4/2) shaly silty clay loam; common, medium and fine, faint mottles of olive brown (2.5Y 4/4); weak, thick, platy structure; firm when moist, plastic when wet; no roots; weakly calcareous.

Texture of the Ap, B2, and A'2 horizons is mostly silt loam or channery silt loam, but loam and channery loam also occur. The IIB and IIC horizons are silty clay loam and clay loam and may be channery or shaly. Coarse fragments of shale, gravel, cobblestones, and channery fragments of sandstone make up from less than 20 percent to more than 50 percent of the horizons, by volume.

In the upper sequum, color ranges from hues of 2.5Y to 10YR, values are 4, 5, and 6, and chromas are 2, 3, and 4. The lower sequum has hues of 2.5Y and 5Y, values of 3 to 6, and chromas of 0, 1, 2, and 3. Mottling generally occurs in the B2 horizon just beneath the Ap horizon. Unplowed soils are commonly forested and have O1, O2, and A1 horizons in place of the Ap horizon. Depth to bedrock is more than 40 inches.

Structure is weak and moderate, very fine and medium, granular in the Ap horizon. It is weak, fine, subangular blocky or moderate, fine and very fine, granular in the A'2 horizon. In the lower sequum, structure is weak and moderate, coarse, prismatic breaking to weak and moderate, thin and medium, platy, and weak and moderate, medium and coarse, angular blocky.

In the upper sequum, consistence is friable or very friable when the profile is moist and is nonsticky or slightly sticky and slightly plastic when it is wet. In the lower sequum, consistence is mostly firm to extremely firm and slightly sticky or sticky and plastic. Reaction in the unlimed upper sequum ranges from less than pH 5.0 to pH 6.6. Depth to calcareous material ranges from 30 inches to 6 feet.

CATTARAUGUS SERIES

The Cattaraugus series consists of deep, well-drained soils that have a fragipan. These soils developed in firm glacial till that was dominantly red sandstone and shale.

The Cattaraugus soils are in the same drainage sequence as the moderately well drained Culvers, the somewhat poorly drained Morris, and the poorly drained and very poorly drained Norwich soils. Cattaraugus soils are somewhat similar to Oquaga soils, which are moderately deep to bedrock and lack a fragipan. They are also similar to Culvers soils but are free of mottles to a depth of 24 inches.

Cattaraugus soils are strongly sloping and occur on uplands in the southern part of the county. The native vegetation consists of hardwood forest composed mainly of beech, maple, and oak.

Typical profile of Cattaraugus stony silt loam, 15 to 25 percent slopes (in a meadow):

Ap—0 to 7 inches, dark reddish-gray (5YR 4/2) stony silt loam; moderate, very fine and fine, granular structure in the upper 2 inches and moderate, fine and medium, subangular blocky structure below 2 inches; friable when moist, slightly sticky and slightly plastic when wet; many fine roots; many, fine and coarse, random pores; coarse fragments make up 40 percent of horizon, by volume; slightly acid; abrupt, smooth boundary. Horizon is 6 to 10 inches thick.

B21—7 to 12 inches, light reddish-brown (5YR 6/3) stony loam, reddish brown (5YR 4/3) when moist; weak, thin, platy structure; firm when moist, slightly sticky and slightly plastic when wet; common fine roots; coarse fragments make up 40 percent of horizon, by volume; medium acid; gradual, smooth boundary. Horizon is 5 to 20 inches thick.

B22—12 to 20 inches, reddish-brown (5YR 5/4) stony loam or silt loam, yellowish red (5YR 5/6) when moist; massive, breaks out in angular clods; firm when moist, slightly sticky and slighty plastic when wet; common fine roots; many, very fine and fine, random, tubular pores; coarse fragments make up 40 percent of horizon, by volume; strongly acid; abrupt, wavy boundary. Horizon is 4 to 10 inches thick.

A'2—20 to 24 inches, pinkish-gray (5YR 6/2) very channery loam, reddish brown (5YR 5/3) when moist; fragments so numerous that structure cannot be determined; extremely firm when moist, nonsticky and nonplastic when wet; no fine roots; many, very fine and fine, random, tubular pores; 70 percent of horizon, by volume, is coarse fragments; strongly acid; abrupt, irregular boundary. Horizon is 0 to 7 inches thick.

C1x—24 to 33 inches, weak-red (10R 4/2) very channery loam, reddish brown (2.5YR 4/4) when moist; massive; extremely firm when moist, very brittle when dry, slightly sticky and slightly plastic when wet; no roots; many, fine and very fine, random tubular pores; strongly acid; abrupt, wavy boundary. Horizon is 6 to 12 inches thick.

IIC2x—33 to 60 inches, weak-red (2.5YR 4/2) channery silt loam; massive, but breaks to medium, angular, blocky clods; extremely firm when moist, brittle when dry, sticky and plastic when wet; no roots; many, very fine and fine pores with continuous thin clay films in the pores; 30 to 50 percent of horizon, by volume, is coarse fragments; slightly acid; diffuse, wavy boundary.

Texture of the solum ranges from loam to silt loam. The solum is stony. Coarse fragments make up from 15 to 70 percent of the solum, by volume, but the average is less than 50 percent. Between depths of 10 inches and 40 inches the coarse fragments are mostly sandstone.

The A horizon has hues of 5YR and 7.5YR, values of 3 and 4, and chromas of 1 to 4. The B horizon has hues of 10R to 7.5YR, values of 3 to 5, and chromas of 3 to 6. The parent material is generally firm, dark reddish-brown (5YR 3/3 to 3/4) to weak-red (2.5YR 4/2) glacial till.

Structure of the plow layer is weak to moderate, very fine and fine, granular to weak and moderate, fine and medium, blocky. Depth to the brittle fragipan ranges from 20 to 36 inches. In unlimed areas reaction ranges from pH 5.0 to pH 5.8. Most Cattaraugus soils in Schohaire County contain more coarse fragments above the fragipan than soils in other places.

CHENANGO SERIES

The Chenango series consists of well-drained soils that developed from glacial outwash materials. These materials were derived mostly from acid local sandstone and shale, but they contain many cobblestones and pebbles that were derived from igneous and metamorphic rocks brought into the area by glaciers.

The Chenango soils are closely associated with the somewhat poorly drained Red Hook soils, which occur on similar materials. They are similar to Howard soils, though the Howard soils have a weakly developed textural B horizon and are higher in lime. Chenango soils are similar to the Tunkhannock soils but do not have the pinkish color that the Tunkhannock soils inherited from red sandstone and shale.

Chenango soils commonly occur on outwash terraces, alluvial fans, and kames. They also occur as hanging deltas on valley walls and on drainage divides, where the glacial material has been reworked by water. The native vegetation consists of deciduous broad-leaved trees, mainly sugar maple, beech, oak, and hickory. Locally there are some hemlock and white pine.

Typical profile of a Chenango soil that has a gravelly silt loam surface layer and simple slopes of 0 to 5 percent (in an idle field):

Ap—0 to 8 inches, dark-brown (7.5YR 3/2) gravelly silt loam; weak, fine, granular structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many fine pores; very strongly acid; abrupt, smooth boundary. Horizon is 7 to 9 inches thick.

B2—8 to 17 inches, strong-brown (7.5YR 5/6) gravelly silt loam; weak, very fine, subangular blocky and weak, fine, granular structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many fine pores; strongly acid; clear, wavy boundary. Horizon is 6 to 9 inches thick.

IIB3—17 to 22 inches, olive-brown (2.5Y 4/4) very gravelly sandy loam; single grain; very friable when moist, nonsticky and nonplastic when wet; fine roots common; many fine pores; medium acid; gradual, wavy boundary. Horizon is 0 to 6 inches thick.

IIIC—22 to 25 inches +, dark grayish-brown (2.5Y 4/2) very gravelly loamy sand; single grain; loose when moist, nonsticky and nonplastic when wet; few fine roots; many medium pores; medium acid.

The surface layer ranges from dark brown (7.5YR 3/2) to olive brown (2.5Y 4/4). It is generally gravelly silt loam or gravelly loam but ranges to fine sandy loam. The surface layer has weak to moderate, very fine to fine, granular structure. In unplowed areas a thin, pinkish-gray A2 horizon occurs. In some plowed areas, there are scattered pockets of the A2 horizon.

The upper part of the B horizon is strong brown (7.5YR 5/6) to brown (10YR 4/2), but colors fade to olive brown (2.5Y 4/4) as depth increases. The B horizon ranges from gravelly silt loam to very gravelly loam or fine sandy loam. It is friable to very friable when moist and slightly sticky and slightly plastic to nonsticky and nonplastic when wet.

Underlying the B horizon are strata that vary in texture and in content of gravel. These strata are mainly layers of sand and gravel that are single grain and normally are very friable or loose when moist.

Reaction of the solum ranges from pH 5.0 to pH 6.0. Reaction of the underlying layer of sand and gravel ranges from pH 5.5 to pH 6.4 at a depth of 24 to 36 inches. In most places

these soils are nonstony, but they have varying amounts of cobblestones in the surface layer. Most of the Chenango soils in Schoharie County contain more sand and have higher reaction than soils in other places.

CHIPPEWA SERIES

The Chippewa series consists of acid, medium-textured, poorly drained soils that have a fragipan. These soils formed from late Wisconsin till consisting of sandstone, siltstone, and shale.

The Chippewa soils are the poorly drained members in the drainage sequence that includes the well drained and moderately well drained Mardin soils and the somewhat poorly drained Volusia soils. They are similar to the Tuller soils but are deeper to bedrock and have a fragipan.

Chippewa soils occur mainly in the southern part of the county on the Allegheny Plateau. They are generally nearly level or depressional but are also in seep spots on steeper slopes. Slopes are mainly 2 to 5 percent, but they are as much as 12 percent in some places at the base of hills where there are seep spots. The native vegetation is forest in which beech, red maple, hemlock, and yellow birch are dominant.

Typical profile of a Chippewa stony silt loam on a slope of 4 percent (in a forest):

O1—1 inch to 0, slightly decomposed mossy mat.

A11—0 to 1 inch, very dark gray (10YR 3/1) stony silt loam; moderate, fine, granular structure; friable when moist, slightly sticky and slightly plastic when wet; abundant medium roots; many fine pores; medium acid; abrupt, smooth boundary. Horizon is 1 to 3 inches thick.

A12—1 to 3 inches dark-gray (10YR 4/1) stony silt loam; weak, medium, subangular blocky structure that readily breaks to moderate, very fine, subangular structure; friable when moist, slightly sticky and slightly plastic when wet; many fine and common medium roots; many fine pores; medium acid; clear, smooth boundary. Horizon is 2 to 3 inches thick.

B2g—3 to 8 inches, dark grayish-brown (2.5Y 4/2) stony silt loam; moderate, fine, subangular blocky structure; friable when moist, slightly sticky and plastic when wet; many very fine and common medium roots; many fine pores; slightly acid; clear, smooth boundary. Horizon is 0 to 5 inches thick.

A'2g—8 to 15 inches, grayish-brown (2.5Y 5/2) stony silt loam that has common, fine, faint mottles of brown to dark brown (10YR 4/3); weak, fine, subangular blocky structure; firm when moist, slightly sticky and plastic when wet; many very fine and common medium roots; many fine pores; slightly acid; abrupt, wavy boundary. Horizon is 7 to 10 inches thick.

B'xg—15 to 25 inches, gray to grayish-brown (2.5Y 5/1) very channery silt loam that has many, medium, prominent mottles of strong brown (7.5YR 5/8); very coarse prismatic structure; very firm when moist, slightly sticky and slightly plastic when wet; no roots; common very fine pores; slightly acid. Horizon is 10 to 20 inches thick.

Cxg—25 to 30 inches +, gray (5Y 5/1) very channery loam that has common, medium, distinct mottles of brown to dark brown (7.5YR 4/4); massive; very firm when moist, slightly sticky and slightly plastic when wet; 50 to 60 percent, by volume, is coarse, channery fragments; no roots; medium acid.

In plowed areas the O1, A11, and A12 horizons are replaced by a layer of dark grayish-brown (2.5Y 4/2) to very dark grayish-brown (2.5Y 3/2) stony silt loam that may have common, fine, distinct mottles of reddish brown (5YR 4/4). Underlying this layer in the wetter areas is a gray (5Y 5/1 to 10YR 5/1) silt loam A'2g horizon that has common and many, fine and medium, prominent mottles of dark brown (7.5YR 4/4) and dark yellowish brown (10YR 4/4) to yellowish red (5YR 4/6). The A'2g horizon has weak and medium, coarse, prismatic structure in some places, but it generally has weak, thick, platy or weak, fine, subangular blocky structure.

In the better drained areas, there are a thin B2g horizon and B'xg horizon as shown in the typical profile. The mottles range from grayish brown (2.5Y 5/2) to strong brown (7.5YR 5/8). These underlying horizons have weak, medium, subangular blocky structure or are massive. Reaction of the solum ranges from pH 5.0 to pH 6.4.

CONESUS SERIES

The Conesus series consists of moderately well drained, medium-textured soils. These soils formed in calcareous glacial till that was derived from sandstone, siltstone, shale, and limestone.

The Conesus soils are in the same drainage sequence as the well-drained Lansing soils, the somewhat poorly drained Appleton soils, the poorly drained Ilion soils, and the very poorly drained Lyons soils. Conesus soils are similar to the Darien soils but have a coarser textured B horizon, lack the blocky silty clay loam substratum, and have a thicker A2 horizon. They are similar to the Nunda soils but are coarser textured and lack the distinct color B horizon.

Conesus soils occur on uplands and are gently sloping to rolling. The native vegetation consists of forest in which maple, beech, and hickory are dominant, and white pine and hemlock grow in local areas.

Typical profile of a Conesus channery silt loam on a slope of 10 percent (in a pasture):

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) channery silt loam; weak, medium, platy structure and weak, fine, granular structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many fine pores; medium acid; abrupt, smooth boundary. Horizon is 7 to 10 inches thick.

A2—8 to 12 inches, yellowish-brown (10YR 5/4) channery silt loam; weak, medium, platy structure; friable when moist, nonsticky and slightly plastic when wet; many fine roots; many fine pores; tongues of this horizon 1 to 2 inches wide extend about 3 inches into the horizon below; medium acid; abrupt, wavy boundary. Horizon is 3 to 5 inches thick.

B21t—12 to 29 inches, brown (10YR 5/3) channery silt loam that has common, fine, faint mottles of yellowish brown (10YR 5/6); moderate, medium, angular blocky structure; firm when moist, slightly sticky and slightly plastic when wet; few fine roots; many fine pores; thin, patchy, dark grayish-brown (10YR 4/2) clay films in pores and on horizontal and vertical faces of peds; medium acid; gradual, wavy boundary. Horizon is 10 to 20 inches thick.

B22t—29 to 36 inches, dark grayish-brown to olive-brown (2.5Y 4/4) channery silt loam that has common, fine, distinct mottles of dark yellowish brown (10YR 4/6); moderate, medium, angular blocky structure; firm when moist, slightly sticky and plastic when wet; few fine roots; many fine pores; thin, discontinuous brown to dark-brown (10YR 4/3) clay films in pores and on vertical and horizontal ped surfaces; slightly acid; gradual, wavy boundary. Horizon is 6 to 12 inches thick.

C—36 to 42 inches, dark grayish-brown (2.5Y 4/2) channery loam that has many, medium, distinct mottles of yellowish brown (10YR 5/6) with grayish-brown (2.5Y 5/2) centers; very firm when moist, slightly sticky and slightly plastic when wet; few fine roots; many, very fine, and fine random tubular pores; thin patchy silt or clay films on horizontal ped faces; neutral.

Texture of the surface layer is channery loam or silt loam in most places. The B horizon is channery silt loam or loam, and its content of clay ranges from 18 to 27 percent. Coarse fragments make up about 20 percent of the solum, by volume, but they make up as much as 50 percent of the C horizon.

These fragments are mostly sandstone, but there is some gneiss, granite, shale, and limestone.

The plow layer has a hue of 10YR, values of 3 and 4, and a chroma of 2. The rest of the solum has hues of 7.5YR, 10YR, and 2.5Y, values of 4 to 6, and chromas of 3 and 4. Mottling occurs at a depth of 12 to 20 inches, but in a few places a few faint mottles are at a depth of 7 to 12 inches.

Structure is mostly strong, very fine and fine, granular in the plow layer; weak, medium, platy in the A2 horizon; and moderate, medium and coarse, subangular blocky in the B horizon. The C horizon is commonly platy, but it breaks into blocky fragments.

Consistence ranges from friable, nonsticky and slightly plastic to firm, sticky and plastic in the solum, and to firm and very firm in the C horizon. In unlimed areas reaction ranges from strongly acid to medium acid in the upper part of the solum, but it is neutral or nearly neutral in the lower part. These soils are calcareous at a depth of 30 to 50 inches.

CULVERS SERIES

The Culvers series consists of deep, moderately well drained soils that have a fragipan. These soils formed in firm glacial till that contains much red sandstone and shale.

Culvers soils are in the same drainage sequence as the well-drained Cattaraugus, the somewhat poorly drained Morris, and the poorly drained and very poorly drained Norwich soils. Culvers soils are differentiated from Morris soils by lack of mottles immediately below the plow layer and from Cattaraugus soils by mottles at a depth of 16 to 24 inches. They are analogs of Mardin soils, which developed from till containing gray sandstone and shale. Associated Oquaga soils are moderately deep to rock, better drained, and do not have a fragipan.

Culvers soils are on smooth rolling uplands in the southern part of the county. The native vegetation consists of sugar maple, beech, white pine, hemlock, and some oak.

Typical profile of a Culvers stony silt loam on a slope of 10 percent (in a hayfield):

Ap—0 to 6 inches, dark-brown (7.5YR 3/2) stony silt loam; moderate, very fine, granular structure; very friable where moist, nonsticky and slightly plastic when wet; many fine roots; 20 percent of horizon, by volume, is coarse fragments; strongly acid; abrupt, smooth boundary. Horizon is 4 to 10 inches thick.

B21—6 to 13 inches, reddish-brown (5YR 4/4) stony silt loam; weak, very fine and fine, subangular blocky structure; very friable when moist, nonsticky and slightly plastic when wet; many fine roots; 20 percent of horizon, by volume, is coarse fragments; strongly acid; abrupt, wavy boundary. Horizon is 5 to 10 inches thick.

B22—13 to 18 inches, reddish-brown (5YR 5/4) stony silt loam that has few, fine, faint mottles of yellowish red (5YR 5/6); very weak, very fine and fine, subangular blocky structure; friable when moist, nonsticky and slightly plastic when wet; common fine roots; 20 percent of horizon, by volume, is coarse fragments; strongly acid; clear, wavy boundary. Horizon is 4 to 10 inches thick.

A'2—18 to 20 inches, light-brown (7.5YR 6/3) channery loam that has many, fine and medium, distinct mottles of strong brown (7.5YR 5/8); weak, medium and thick, platy structure; firm when moist, slightly plastic when wet; few fine roots; 20 percent, by volume, is coarse fragments; strongly acid; abrupt, irregular boundary. Horizon is 1 to 5 inches thick.

B'x1—20 to 27 inches, reddish-brown (5YR 4/3) channery silt loam that has few, fine and medium mottles of very faint brown to dark brown (7.5YR 4/4); weak, medium and coarse, subangular blocky structure within 18- to 24-inch polygons; polygons have exterior coatings of pinkish gray (7.5YR 6/2) and intervening coatings of strong brown (7.5YR 5/8) and interiors of reddish brown (5YR 4/3); the thin silty exterior coatings are ½ to 1 inch thick at the top of the pan and gradually taper to nothing with depth; extremely firm and brittle when moist, nonsticky and slightly plastic when wet; discontinuous clay films in pores; few fine roots along polygon borders; 30 percent of horizon, by volume, is coarse fragments; strongly acid; diffuse, wavy boundary. Horizon is 6 to 12 inches thick.

B'x2—27 to 55 inches, reddish-gray (5YR 5/2) channery silt loam with prominent manganese staining; very weak, coarse, subangular blocky structure within 18- to 24-inch polygons, which are coated with silty material as in the horizon above; extremely firm and brittle when moist, slightly plastic when wet; few roots along polygon faces; 30 percent of horizon, by volume, is coarse fragments; medium acid; diffuse, wavy boundary. Horizon is 26 to 34 inches thick.

Cx—55 to 72 inches, reddish-brown (5YR 4/3) channery silt loam with dark reddish-gray (5YR 4/2) coatings on platy surfaces; weak, thick, platy structure; extremely firm and brittle when moist, slightly sticky and plastic when wet; clay films are prominent in the pores and discontinuous on the platy surfaces; no roots; 30 to 40 percent of horizon, by volume, is coarse fragments; slightly acid.

Texture of the solum is dominantly loam and silt loam that are stony or channery. Coarse fragments make up 15 to 50 percent of the solum, by volume, and include a random boulder in places.

The surface layer has hues of 2.5YR to 7.5YR, a value of 3, and chromas of 2, 3, and 4. The B2 horizon has hues of 2.5YR and 5YR, values of 4, 5, and 6, and chromas of 3 to 6.

Depth to the fragipan ranges from 16 to 24 inches. The fragipan (B'x and Cx horizons) has colors with hues of 2.5YR and 5YR, values of 4 and 5, and chromas of 2 and 3. In many places an A'2 horizon is above the fragipan.

Depth to mottling ranges from 13 to 24 inches. Most mottles are faint, but in some places mottles are few or common and distinct. In unlimed areas reaction ranges from pH 5.0 to pH 5.8.

DARIEN SERIES

The Darien series consists of moderately well drained and somewhat poorly drained, moderately fine textured soils. These soils are somewhat poorly drained in most areas. They formed principally in dark-colored, calcareous glacial till that was dominated by soft, clayey, dark shale. In some places they formed from reworked lake sediments of similar color and texture. The solum is slightly acid to neutral, and the substratum is neutral to calcareous.

These soils are in the same drainage sequence as the poorly drained Ilion soils, which are the only other soils of this sequence mapped in Schoharie County. Darien soils are the moderately fine textured analogs of the closely associated Mohawk and Conesus soils. They somewhat resemble the closely associated Hudson and Rhinebeck soils but are darker and more olive in color, are coarser in texture, vary more in particle size, and have a significant component of coarse fragments. They are similar to the Erie soils but do not have a fragipan. They are also similar to Appleton soils but have a finer textured, more blocky subsoil. Darien soils are similar to the Nunda and Burdett soils, which are bisequal and have a color B horizon over a moderately fine textured B horizon.

Darien soils have slopes of 2 to 25 percent and occur on uplands in the northern part of the county. The native vegetation is hardwood forest consisting mainly of oak, maple, beech, hickory, and elm.

Typical profile of a Darien silt loam on a slope of 8 percent (in an idle field):

Ap—0 to 7 inches, very dark grayish-brown (2.5Y 3/2) silt loam; moderate, fine, granular structure; very friable

when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many fine pores; neutral; abrupt, smooth boundary. Horizon is 5 to 13 inches thick.

A2—7 to 9 inches, olive-brown (2.5Y 4/4) silt loam with dark grayish-brown (2.5Y 4/2) coatings on ped faces; common, medium, distinct mottles of yellowish brown (10YR 5/6); weak, medium, platy structure that breaks readily to weak or moderate, very fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many fine pores; neutral; abrupt, wavy boundary. Horizon is 2 to 10 inches thick.

B21tg—9 to 17 inches, dark grayish-brown (2.5Y 4/2) silty clay loam with thin to medium, dark grayish-brown (2.5Y 4/2) silt coatings similar to material in A2 horizon on ped surfaces; many, fine and medium, distinct mottles of yellowish brown (10YR 5/6); weak, medium, prismatic structure that breaks readily to strong, medium, angular blocky structure; firm when moist, sticky and very plastic when wet; plentiful fine roots; many fine pores; neutral; clear, wavy boundary. Horizon is 4 to 13 inches thick.

B22tg—17 to 34 inches, gray (5Y 5/1) silty clay loam that has common, medium, distinct mottles of brown to dark brown (10YR 4/3) and common, fine, distinct mottles of yellowish brown (10YR 5/6); weak, coarse, prismatic and weak, thick, platy structure that breaks to moderate, angular blocky structure; firm when moist, sticky and very plastic when wet; few fine roots; many very fine pores and common fine pores; thin to medium continuous clay films on ped faces and in pores; neutral; gradual, wavy boundary. Horizon is 7 to 17 inches thick.

Cg—34 to 54 inches +, gray (5Y 5/1) shaly clay loam that has many, medium, prominent mottles of yellowish brown (10YR 5/6); weak, thick, platy structure that breaks to weak, medium, angular blocky structure; firm when moist, very sticky and very plastic when wet; few fine roots; common fine pores; thin to medium patchy coatings on vertical ped faces and in pores; neutral.

The texture of the surface layer is generally silt loam but is loam in a few places. The A2 horizon is mostly silt loam but is silty clay loam in a few places. The B horizon ranges from clay loam to silty clay in texture. In the B horizon, clay concentration generally ranges from 28 to 35 percent, but some thin horizons have clay concentrations as low as 20 percent and others as high as 45 percent. In areas where eolian deposits are thick enough, a color B horizon develops over the finer textured substratum, and in these areas, Darien soils intergrade to Nunda and Burdett soils. Where this color B horizon is present in Darien soils, it is normally destroyed by plowing to a depth of 10 inches. Texture of the C horizon is shaly clay loam or silty clay loam. Few to many shale fragments and hard pebbles generally occur in the solum and parent material.

The Ap horizon has hues of 2.5Y and 10YR, values of 3 and 5, and chromas of 2 and 3. Immediately beneath this layer, a chroma of 2 is generally dominant with distinct mottles. In the moderately well drained soils, there is a chroma of 3 with faint or no mottles in the A2 horizon and upper part of the B horizon. The B horizon has hues of 10YR to 5Y, values of 3 to 6, and chromas of 1 to 4. This horizon is dominantly dark grayish brown (2.5Y 4/2). Mottles with high chroma make up more than 40 percent of the matrix. In the moderately well drained soils, the upper part of the B horizon is free of mottles, or is only faintly mottled, and has a chroma of 3 in the matrix. In wetter areas the B horizon has common to many, fine and medium, distinct to prominent mottles. These mottles have hues of 7.5YR and 10YR, values of 3 to 5 and chromas of 3 to 8. The C horizon has hues of 2.5Y and 5Y, values of 3 to 5, and chromas of 1 to 4. This horizon has few to many, fine and medium, distinct and prominent mottles of yellowish brown.

Structure in the Ap horizon ranges from weak and moderate, fine and medium, granular to weak and moderate, fine and medium, subangular blocky. The A2 horizon generally has weak and moderate, medium, platy structure or weak and moderate, very fine and fine, subangular blocky structure. The B horizon generally has weak, medium, prismatic structure that breaks to moderate and strong, fine and medium, angular blocky structure, but in places structure is weak, coarse, prismatic and weak, fine and medium, subangular blocky. Thin clay films are generally present on ped faces and in pores. The C horizon generally has weak, thick, platy structure or is massive.

The B horizon is generally firm when moist and sticky and plastic when wet. In the finer textured areas, however, this horizon is very firm when moist and sticky and very plastic when wet. In the coarser textured areas, consistence is firm when moist and slightly sticky and plastic when wet. In reaction the solum ranges from pH 5.2 to pH 7.0. Depth to bedrock ranges from about 24 inches to many feet.

ERIE SERIES

The Erie series consists of medium-textured, somewhat poorly drained soils that have a well-developed fragipan. These soils developed in late Wisconsin till consisting mostly of dark-colored shale.

Erie soils are in the same drainage sequence as the moderately well drained Langford soils. They occur with the Nunda and Darien soils. They occur closely and are intermingled with the Burdett soils, which are similar but lack a well-expressed fragipan. Erie soils are similar to the Volusia soils but have a higher content of dark-colored shale, are less acid in the fragipan, and are calcareous nearer the surface. They are also similar to the Darien soils, which lack a color B horizon and a fragipan and have a silty clay loam, blocky B horizon.

The Erie soils are gently sloping to sloping and occur on the low plateau in the northern part of the county. They often receive runoff from higher lying, better drained soils. The native vegetation consists mainly of timothy and other moisture-tolerant plants. Forested areas are dominantly of oak, hickory, and white pine.

Typical profile of an Erie channery silt loam on a slope of 4 percent (in a meadow):

Ap—0 to 5 inches, very dark grayish-brown (10YR 3/2) channery silt loam; weak, medium, platy and weak, fine, granular structure; friable when moist, slightly sticky and slightly plastic when wet; estimated 20 percent, by volume, is channery fragments; many fine roots; common fine pores; slightly acid; abrupt, smooth boundary. Horizon is 5 to 10 inches thick.

A2—5 to 7 inches, about 70 percent dark grayish-brown (10YR 4/2) and 30 percent yellowish-brown (10YR 5/4) channery silt loam; weak, very fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; many fine roots; many fine pores; 20 percent, by volume, is channery fragments; slightly acid; abrupt, irregular boundary. Horizon is 0 to 3 inches thick.

B21—7 to 13 inches, yellowish-brown (10YR 5/4) channery silt loam to loam that has fine, distinct mottles of gray (2.5Y 5/1); weak to moderate, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; few fine roots; many fine pores and few, medium to coarse pores; about 35 percent, by volume, is channery fragments; slightly acid; clear, wavy boundary. Horizon is 2 to 7 inches thick.

B22—13 to 18 inches, grayish-brown (2.5Y 5/2) to light olive-brown (2.5Y 5/4) channery loam to silt loam that has common, fine, distinct mottles of yellowish brown (10YR 5/6); weak, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; few fine roots; common fine pores; about 35 percent, by volume, is channery fragments; medium acid; clear, wavy boundary. Horizon is 0 to 10 inches thick.

A'2—18 to 21 inches, grayish-brown (2.5Y 5/2) to light olive-brown (2.5Y 5/4) channery loam that has many, medium, prominent mottles of strong brown (7.5YR 5/6); weak, medium, platy structure; firm when moist,

slightly sticky and slightly plastic when wet; very few fine roots; many fine pores; about 40 percent, by volume, is channery fragments; slightly acid; abrupt, irregular boundary. Horizon is 1 to 3 inches thick.

B'xg—21 to 40 inches, gray (5Y 5/1) channery loam that has many, medium, prominent mottles of yellowish brown (10YR 5/6); weak, very coarse, prismatic structure that breaks to very weak, fine to medium, subangular blocky structure; firm and brittle when moist, slightly sticky and plastic when wet; very few fine roots in cracks; many fine pores; about 35 percent, by volume, is channery fragments; neutral; clear, wavy boundary. Horizon is 70 to 24 inches thick.

C—40 to 60 inches +, olive-brown (2.5Y 4/4) channery loam; massive; firm when moist, slightly sticky and slightly plastic when wet; no roots; few fine pores; about 40 percent, by volume, is channery fragments; calcareous.

The surface layer ranges from very dark grayish brown (10YR 3/2) to brown or dark brown (10YR 4/3). It is generally channery silt loam but in places is channery loam. The surface layer has mostly weak, fine, granular structure in the upper part and weak, fine, subangular blocky structure in the lower part.

Underlying the surface layer in most places is a color B horizon that ranges from dark yellowish brown (10YR 4/4) through olive brown (2.5Y 3/4) to brownish yellow (10YR 6/6). This horizon is generally channery silt loam but in places it is channery loam. The color B horizon has weak and moderate, fine and medium, subangular blocky structure. It is friable when moist and slightly sticky and slightly plastic when wet. It generally has common, fine, distinct mottles.

Underlying the color B horizon is an A'2 horizon that is generally lighter gray in color, has weak, medium, platy structure, and is directly underlain by a fragipan. This fragipan, or B'xg horizon, occurs at a depth ranging from 15 to 21 inches. It is mottled; matrix colors range from light gray and gray (N 6/0) through light brownish gray (2.5Y 6/2) to dark gray (5Y 4/1). The mottles are generally many, medium, and prominent, but in places they are common, fine, and distinct. The B'xg horizon is firm to extremely firm when moist and is slightly sticky and slightly plastic to plastic when wet. Texture of the fragipan is generally channery silt loam but in places is channery loam. Reaction ranges from pH 6.1 to pH 6.8.

Underlying the fragipan, at a depth of 30 to 40 inches, is a calcareous channery loam or channery silt loam C horizon. It is firm to very firm when moist and is normally sticky and plastic when wet. Structure is generally platy. Coarse fragments, which are mostly channery, make up from 20 to 50 percent of the horizon, by volume. Some thin horizons are 50 percent coarse fragments. In most areas the Erie soils are stony, but in some areas they are very stony.

FARMINGTON SERIES

The Farmington series consists of shallow, well-drained and excessively drained soils in loamy deposits that lie unconformably over hard limestone. An unmottled color B horizon rests directly on the rock or is separated from it by a thin, mottled horizon that is not strongly gleyed. The upper part of the solum is strongly acid to slightly acid, and the lower part is medium acid to neutral.

Farmington soils occur mainly in the northern part of the county in close association with the Mohawk, Honeoye, and Darien soils. They are closely intermingled with the Honeoye soils in many places. Farmington soils are similar to shallow Arnot soils but have a smaller amount of coarse fragments in the solum, do not have fragments of shale or slate, and have a higher base status.

Typical profile of a Farmington silt loam on a slope of 3 percent (in a cultivated field):

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam that contains a few, noncalcareous, coarse fragments; moderate, medium and fine, granular structure; friable when moist; many fine roots; slightly acid; abrupt, smooth boundary. Horizon is 4 to 8 inches thick.

B21—8 to 18 inches, silt loam that is brown to dark brown (10YR 4/3) uncrushed and brown to yellowish brown (10YR 5/3 to 5/4) crushed; few, noncalcareous, coarse fragments; weak, medium and fine, subangular blocky structure having pressure faces but with no clay films; very friable when moist; many fine roots; earthworm channels common; slightly acid; abrupt, wavy boundary. Horizon is 6 to 12 inches thick.

B22—18 to 20 inches, brown (10YR 5/3) loam that contains a few, noncalcareous, coarse fragments; common, fine, faint mottles of grayish brown (10YR 5/2); weak, fine, subangular blocky structure; friable when moist; common fine roots; common earthworm channels; slightly acid; abrupt, wavy boundary. Horizon is 0 to 6 inches thick.

IIR—20 inches +, hard massive limestone that has a slightly discolored surface suggestive of incipient weathering; joints 2 to 10 inches wide and spaced 3 to 10 feet apart; one joint 6 inches wide below the profile described is filled with neutral, but noncalcareous, brown (10YR 4/3) clay loam having moderate, medium, blocky structure and distinct patchy clay films on ped faces; alfalfa roots and worm channels extend at least 18 inches into this joint filling.

The texture of the solum is mostly silt loam, but in places it is loam. The soil material between joints in the bedrock is finer textured than loam.

The plow layer has a hue of 10YR, a value of 3 or 4, and chromas of 2 through 4. The B horizon has a hue of 10YR, a value of 3 or 4, and a chroma of 3 or 4. In the deeper areas of these soils, a thin, dark grayish-brown (2.5Y 4/2 or 10YR 4/2) mottled zone is present just above the bedrock.

In unlimed areas, soil reaction of the topmost 12 inches ranges from strongly acid to neutral. Within 2 inches of the bedrock, reaction ranges from medium acid to neutral. Carbonates are not present in the fine earth.

The structure of the B horizon ranges from weak, very fine, subangular blocky to weak, fine, granular. Soils deeper than 15 inches contain only a few coarse fragments, but shallower soils may contain some limestone fragments.

FREDON SERIES

The Fredon series consists of somewhat poorly drained soils that developed in glaciofluvial materials of Wisconsin age. These materials are moderately calcareous to nearly neutral within 3 to 5 feet of the surface.

Fredon soils are in the same drainage sequence as the well drained Howard soils, the moderately well drained Phelps soils, and the poorly drained to very poorly drained Halsey soils. They are similar to, but less acid than, the Red Hook soils.

Fredon soils are nearly level in most places. They occur on outwash plains, fluvial terraces, and on the margin of fluvial terraces. On terrace margins they are moderately steep to steep and occur in seeps. The native vegetation consists of water-tolerant trees such as red maple, elm, willow, and ash, and there are some sedges.

Typical profile of a Fredon gravelly loam on a slope of 4 percent (in a hayfield):

Ap—0 to 7 inches, very dark brown (10YR 2/2) gravelly loam; moderate, medium, granular structure; friable when moist, slightly sticky and slightly plastic when wet; many fine roots; common, fine and medium pores; neutral; abrupt, smooth boundary. Horizon is 6 to 10 inches thick.

B1—7 to 11 inches, grayish-brown (10YR 5/2) gravelly loam that has thin, continuous, very dark gray (10YR 3/1) coatings of organic matter on peds and has common, fine, distinct mottles of yellowish brown (10YR 5/6); moderate, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when

wet; plentiful fine roots; common, fine and medium pores; neutral; clear, wavy boundary. Horizon is 3 to 9 inches thick.

B2—11 to 24 inches, grayish-brown (2.5Y 5/2) to light olive-brown (2.5Y 5/4) gravelly loam that has thin to medium, discontinuous, very dark grayish-brown (2.5Y 3/2) silt coats on ped faces and clay linings in pores and that has many distinct mottles of yellowish brown (10YR 5/6); moderate, fine, angular blocky structure; friable when moist, slightly sticky and plastic when wet; plentiful fine roots; many, very fine and fine pores; neutral; abrupt, wavy boundary. Horizon is 6 to 15 inches thick.

B3—24 to 34 inches, very dark grayish-brown (2.5Y 3/2) gravelly loam that has common, fine, prominent mottles of yellowish brown (10YR 5/6); weak, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; few, very fine and fine roots; many, very fine and fine pores; neutral; gradual, wavy boundary. Horizon is 8 to 12 inches thick.

IIC1—34 to 43 inches, very dark gray (2.5Y 3/1) to very dark grayish-brown (2.5Y 3/2) very gravelly sandy loam (mostly black shale and sandstone gravel) that has common, medium, prominent mottles of yellowish brown (10YR 5/6); weak, fine, subangular blocky structure; friable when moist, slightly sticky and nonplastic when wet; no roots; many, fine and medium pores; neutral; gradual, wavy boundary. Horizon is 8 to 12 inches thick.

IIIC2—43 to 48 inches +, very dark grayish-brown (2.5Y 3/2) very gravelly sandy clay loam that has common, fine, prominent mottles of light olive brown (2.5Y 5/6); massive; friable when moist, slightly sticky and slightly plastic when wet; common fine pores; strong effervescence with cold dilute hydrochloric acid.

The texture of the surface layer is gravelly loam or silt loam. In some areas a mottled A2g horizon occurs under the surface layer. The subsoil generally has moderately coarse to medium texture and contains less than 35 percent of gravel. Texture varies in the underlying strata, but the content of gravel is more than 35 percent. Thin layers of very fine sand and silt are interbedded with the gravelly layers in many places.

Depth to calcareous material ranges from 24 to 45 inches. This depth ranges from 24 to 30 inches on the highly calcareous material and generally ranges from 35 to 45 inches on the moderately calcareous material. Most of the Fredon soils in Schoharie County have less sand in the substratum than have soils in other places.

HALSEY SERIES

The Halsey series consists of poorly drained and very poorly drained soils that developed in glaciofluvial materials of Wisconsin age. These materials are moderately calcareous within 18 to 48 inches of the surface. They contain gray sandstone, siltstone, shale, limestone, and slate and a small amount of crystalline rock materials.

Halsey soils are in the same drainage sequence as the well drained Howard soils, the moderately well drained Phelps soils, and the somewhat poorly drained Fredon soils.

Halsey soils commonly are in slight depressions on level terraces. The native vegetation consists of American elm, red maple, ash, willow, and other water-tolerant trees and of sedges and rushes.

Typical profile of a Halsey gravelly loam on a slope of 2 percent (in an idle field):

O1—2 inches to 0, very dark brown (10YR 2/2) root mat: slightly acid; abrupt, smooth boundary. Horizon is 1 to 3 inches thick.

A11—0 to 4 inches, very dark brown (10YR 2/2) gravelly loam that has common, fine, distinct mottles of dark brown (10YR 4/3); moderate, medium, granular structure; very friable when moist, slightly sticky and slightly plastic when wet; abundant, fine and medium roots; many, fine and medium pores; slightly acid; abrupt, wavy boundary. Horizon is 2 to 4 inches thick.

A12—4 to 10 inches, dark-brown (7.5YR 3/2) gravelly loam that has many, fine, distinct mottles of reddish brown (5YR 4/4) and light brownish gray (10YR 6/2); moderate, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; abundant, fine and medium roots; common, fine and medium pores; slightly acid; abrupt, wavy boundary. Horizon is 5 to 8 inches thick.

C1g—10 to 21 inches, dark grayish-brown (2.5Y 4/2) gravelly loam that has many, fine, distinct mottles of reddish brown (5YR 4/4) and pale brown (10YR 6/3); massive; firm when moist, slightly sticky and plastic when wet; few fine roots in upper part; common fine pores; neutral in upper part but calcareous below 18 inches; abrupt, wavy boundary. Horizon is 9 to 12 inches thick.

IIC2g—21 to 30 inches, dark grayish-brown (2.5Y 4/2) gravelly loamy sand that has few, fine, distinct mottles of brown to dark brown (7.5YR 4/4); single grain; friable when moist, nonsticky and nonplastic when wet; no roots; common, fine pores; violent effervescence with cold dilute hydrochloric acid; clear, wavy boundary. Horizon is 8 to 12 inches thick.

IIIC3g—30 to 34 inches +, dark grayish-brown (2.5Y 4/2) cobbly loamy sand that has few, fine, distinct mottles of brown to dark brown (7.5YR 4/4); single grain; friable when moist, nonsticky and nonplastic when wet; common, fine pores; violent effervescence with cold dilute hydrochloric acid.

The texture of the topmost mineral layer ranges from gravelly sandy loam to silt loam. Below this layer, to a depth of 20 inches, the texture ranges from loam to sandy loam and in many places is gravelly or cobbly. The content of sand and gravel increases with depth.

The degree of mottling varies in these soils. In some places there is scarcely any mottling, and dark grayish colors may continue down without change from just beneath the A horizon to deep in the C horizon. Depth to calcareous material ranges from 18 to 48 inches.

HOLLY SERIES

The Holly series consists of poorly drained and somewhat poorly drained soils that developed on recent alluvium. This alluvium washed from soils derived from acid gray sandstone and shale.

Holly soils are in the same drainage sequence as the well drained Tioga soils, the moderately well drained Middlebury soils, and the very poorly drained Papakating soils. They are also considered catenary associates of the well drained Barbour soils and the moderately well drained Basher soils, both of which developed in reddish alluvium from soils derived from acid red standstone and shale. Holly soils are similar to the Wayland soils, which are slightly acid or calcareous instead of strongly acid to slightly acid.

Holly soils are level or slightly depressional and are on bottom lands and low terraces. The native vegetation consists of American elm, red maple, alder, willow, and other water-tolerant trees.

Typical profile of a Holly silt loam (in a pasture):

Ap—0 to 4 inches, dark grayish-brown (2.5Y 4/2) silt loam that has common, fine, distinct mottles of strong brown (7.5YR 5/6) along root channels; moderate, fine and medium, angular blocky structure; firm when moist, slightly sticky and plastic when wet; abundant fine roots; many very fine, fine, and medium pores; slightly acid; abrupt, smooth boundary. Horizon is 3 to 10 inches thick.

C1g—4 to 14 inches, dark grayish-brown (2.5Y 4/2) silt loam that has many, medium, distinct mottles of strong

brown (7.5YR 5/6) with dark reddish-brown (5YR 3/2) centers; moderate, medium and coarse, prismatic structure that breaks to weak, thin and medium, platy structure and some moderate, fine and medium, subangular blocky structure; firm when moist, sticky and plastic when wet; common fine roots; common fine and medium pores; slightly acid; abrupt, wavy boundary. Horizon is 3 to 11 inches thick.

C2g—14 to 22 inches, grayish-brown (2.5Y 5/2) to dark grayish-brown (2.5Y 4/2) silt loam that has many, fine, prominent mottles of yellowish red (5YR 4/6 and 5/6), some of which have very dark gray (5YR 3/1) centers; weak, thin and medium, platy structure; friable when moist, sticky and plastic when wet; common fine roots; common fine and medium pores; slightly acid; abrupt, wavy boundary. Horizon is 5 to 12 inches thick.

C3g—22 to 26 inches, olive-gray (5Y 5/2) silt loam that has common, medium, distinct mottles of dark reddish brown (5YR 3/2) and common, fine, distinct mottles of yellowish red (5YR 5/6); moderate, medium and thick, platy structure; friable when moist, sticky and plastic when wet; few fine roots; common fine pores; slightly acid; abrupt, smooth boundary. Horizon is 0 to 9 inches thick.

C4g—26 to 36 inches +, brown to dark-brown (7.5YR 4/2) silt loam that has few, medium, faint mottles of brown (7.5YR 5/4) and strong brown (7.5YR 5/6) and medium distinct mottles of dark reddish brown (5YR 3/2); massive; friable when moist, sticky and plastic when wet; few fine roots in earthworm channels; common, medium and coarse pores that appear to be mostly earthworm channels; slightly acid.

The texture of the topmost 40 inches of these soils is generally silt loam, but in places it is silty clay loam. The surface layer and the other upper horizons are normally free of coarse fragments, but in some places layers of gravel occur in the substratum below a depth of 40 inches. They also occur as discontinuities in the upper layers. These coarse fragments do not make up more than 15 percent, by volume, of the soil mass between depths of 10 and 40 inches. Depth to contrasting gravelly strata is normally more than 40 inches.

Colors have hues ranging from 7.5YR through 5Y, but generally hues are 2.5Y and 10YR, chromas are 1 and 2, and values are 4 and 5. The A horizon is usually darker in the poorly drained soils. Mottling generally occurs directly beneath the A horizon and also, around root channels, in the A horizon.

Consistence is friable to firm when these soils are moist and is slightly sticky and slightly plastic to sticky and plastic when they are wet. Reaction ranges from strongly acid to slightly acid, but the pH is higher than 5.5 between depths of 10 and 40 inches, and it increases with increasing depth.

HONEOYE SERIES

The Honeoye series consists of well-drained soils that developed on firm, highly calcareous till of late Wisconsin age. This till is dominated by limestone, but it contains a fairly large amount of acid gray shale and sandstone and some crystalline rocks.

Honeoye soils are in the same drainage sequence as the moderately well drained Lima soils, the somewhat poorly drained Appleton soils, and the poorly drained and very poorly drained Lyons soils. Honeoye soils are similar to the Mohawk soils but are not so dark colored and do not have such strong structure. Honeoye soils are also similar to Lansing soils but have a thinner solum and are slightly acid to neutral instead of strongly acid in the upper part of the solum.

Honeoye soils occur on the low, rolling plateau in the northern part of the county. They have slopes of 2 to 20 percent. The native vegetation is deciduous forest consisting mainly of sugar maple, basswood, and ash, but there is some hophornbeam, shagbark hickory, and bitternut hickory.

Typical profile of a Honeoye silt loam on a slope of 12 percent (in a pasture):

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak to moderate, fine, granular structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many fine pores; slightly acid; few coarse fragments; abrupt, smooth boundary. Horizon is 4 to 9 inches thick.

A2—8 to 10 inches, brown (10YR 5/3) silt loam; weak, thin, platy structure compounded with moderate, very fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many fine pores; neutral; few coarse fragments; abrupt, wavy boundary. Horizon is 0 to 5 inches thick.

B2t—10 to 25 inches, brown to dark-brown (10YR 4/3) channery loam; thin, discontinuous, dark grayish-brown (10YR 4/2) clay films on vertical and horizontal ped faces and thin, continuous, dark grayish-brown (10YR 4/2) clay films in pores; brown (10YR 5/3) silt loam surrounds some peds and occupies pockets in the upper 4 inches; medium and coarse prismatic structure that breaks to moderate to strong, fine, angular blocky structure; firm when moist, slightly sticky and slightly plastic when wet; plentiful fine roots; many fine pores; neutral; abrupt, wavy boundary. Horizon is 15 to 20 inches thick.

C—26 to 28 inches +, brown to dark-brown (10YR 4/3) channery loam; weak, thick, platy structure; firm when moist, slightly sticky and slightly plastic when wet; few fine roots; many fine pores; calcareous.

The Ap horizon ranges from very dark grayish brown (10YR 3/2) to dark grayish brown (10YR 4/2). In texture it is dominantly silt loam but is channery silt loam in some places. The Ap horizon has weak to strong, fine and medium, granular structure. In most places there is an A2 horizon of pale-brown (10YR 6/3) or brown (10YR 5/3) silt loam or gravelly or channery silt loam.

The B horizon has a hue of 10YR, values of 3 to 5, and chromas of 3 and 4. In texture it ranges from channery silt loam to channery or gravelly loam and has a clay content ranging from 18 to 28 percent. Structure of the B horizon is weak, medium and coarse, prismatic but breaks to moderate and strong, fine and medium, blocky. The B horizon is friable to firm when moist and is slightly sticky and slightly plastic to sticky and very plastic when wet.

The C horizon generally has a hue of 2.5Y, but in places its hue is 10YR. Its value is 4, and its chromas are 3, 4, and 5. Texture of the C horizon is commonly channery loam but, in places, is channery or gravelly silt loam. Structure is weak, thick, platy to weak, medium, angular blocky. Consistence of the C horizon is firm to very firm when moist and is slightly sticky and slightly plastic to sticky and plastic when wet. Reaction of the solum ranges from pH 6.4 to pH 7.0. Depth to calcareous material ranges from 24 to 32 inches.

HOWARD SERIES

The Howard series consists of well-drained soils with weakly developed structure in the B horizon. These soils formed in moderately to strongly calcareous, glaciofluvial sand and gravel that were dominated by sandstone, shale, and limestone. The soils are calcareous to a depth of 40 to 72 inches.

Howard soils are in the same drainage sequence as the moderately well drained Phelps soils, the somewhat poorly drained Fredon soils, and the poorly drained and very poorly drained Halsey soils. The Howard soils are similar to the Chenango soils but are less acid and have a greater concentration of clay.

Howard soils are nearly level to steep. They occur on fluvial terraces, glacial outwash plains, and kames. The native vegetation is forest consisting mainly of sugar maple, beech, oak, hickory, and some hemlock and white pine.

Typical profile of Howard gravelly silt loam on a slope of 14 percent (in an idle field):

Ap1—0 to 3 inches, dark grayish-brown (10YR 4/2) gravelly silt loam; moderate, fine, granular structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many fine pores; medium acid; abrupt, smooth boundary. Horizon is 2 to 3 inches thick.

Ap2—3 to 6 inches, dark grayish-brown (10YR 4/2) gravelly silt loam; moderate, very fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many fine pores; slightly acid; clear, wavy boundary. Horizon is 2 to 5 inches thick.

B&A—6 to 12 inches, yellowish-brown (10YR 5/4) gravelly loam that has brown to dark-brown (10YR 4/3), thin, discontinuous clay films on ped faces and in pores; pale-brown (10YR 6/3), bleached sand grains surround some of the peds and occupy small pockets; moderate, very fine, angular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many fine pores; slightly acid; clear, wavy boundary. Horizon is 5 to 8 inches thick.

B21t—12 to 28 inches, yellowish-brown (10YR 5/4) very gravelly loam that has medium, bridging, very dark grayish-brown (10YR 3/2) to dark grayish-brown (10YR 4/2) clay films on gravel, on ped faces, and in pores; weak, fine to medium, subangular blocky structure; firm when moist, sticky and plastic when wet; plentiful to few fine roots; many fine pores; slightly acid; gradual, wavy boundary. Horizon is 12 to 18 inches thick.

B22t—28 to 47 inches, brown (10YR 5/3) very gravelly loam that has medium, patchy, dark grayish-brown (10YR 4/2) clay films on ped faces and in pores; weak, medium, subangular blocky structure; friable when moist, slightly sticky and plastic when wet; common fine pores; neutral; clear, wavy boundary. Horizon is 16 to 24 inches thick.

C—47 to 52 inches +, dark grayish-brown (2.5Y 4/2) very gravelly sandy loam that has few, medium, distinct mottles of brown to dark brown (7.5YR 4/4); single grain; friable when moist, slightly sticky and slightly plastic when wet; no roots; many fine and medium pores; strong effervescence in cold dilute hydrochloric acid.

The surface layer ranges from very dark brown (10YR 2/2) to dark grayish brown (10YR 4/2). It is generally gravelly silt loam but is silt loam in some places.

The B horizon ranges from very dark grayish brown (2.5Y 3/2) to yellowish brown (10YR 5/4). It is generally very gravelly loam, but in some places it includes thin layers of silt loam or heavy silt loam. The content of clay ranges from about 10 to 18 percent, and the content of gravel ranges from 35 to more than 50 percent, by volume. Consistence of the B horizon ranges from friable to firm when moist and from slightly sticky and slightly plastic to sticky and plastic when wet. Depth to carbonates ranges from 40 to 60 inches.

HUDSON SERIES

The Hudson series consists of well drained and moderately well drained soils. These soils formed in moderately calcareous sediments of silt and clay that were deposited in ancient glacial lakes.

Hudson soils are in the same drainage sequence as the somewhat poorly drained Rhinebeck soils and the poorly drained and very poorly drained Madalin soils. They are similar to the Schoharie soils but are not so red, because their parent material was not red.

Hudson soils are sloping. They occur on dissected lake plains along the major valleys in the county. The native vegetation is sugar maple, red oak, hickory, basswood, and some beech in local areas.

Typical profile of a Hudson silty clay loam on a slope of 30 percent (in an idle field):

Ap—0 to 5 inches, very dark grayish-brown silty clay loam (2.5Y 3/2); strong, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many fine pores; slightly acid; abrupt, smooth boundary. Horizon is 5 to 6 inches thick.

B&A—5 to 10 inches, light olive-brown (2.5Y 5/4) silty clay loam with thin, discontinuous, brown to dark-brown (10YR 4/3) clay films on ped faces; few, pale-brown (10YR 6/3), bleached sand grains on ped faces; strong, fine and medium, subangular blocky structure; firm when moist, slightly sticky and plastic when wet; abundant fine roots; many fine pores; slightly acid; abrupt, wavy boundary. Horizon is 5 to 9 inches thick.

B21t—10 to 22 inches, dark grayish-brown (10YR 4/2) silty clay with thin, continuous, dark-gray (5Y 4/1) clay films on ped faces and in pores; common, medium, faint mottles of dark yellowish brown (10YR 4/4); moderate, coarse, prismatic structure that breaks to moderate, medium, angular blocky structure; firm when moist, sticky and plastic when wet; few fine roots; many fine pores; slightly acid; abrupt, wavy boundary. Horizon is 10 to 14 inches thick.

B22t—22 to 36 inches, very dark grayish-brown (10YR 3/2) silty clay with medium, continuous, dark-gray (5Y 4/1) clay films on ped faces; moderate, medium and coarse, angular blocky structure; firm when moist, sticky and plastic when wet; no roots; many fine pores; neutral; abrupt, wavy boundary. Horizon is 8 to 14 inches thick.

C—36 to 42 inches +, dark-brown (10YR 3/3) clay with thick, continuous, dark-gray (10YR 4/1) clay films on ped faces and in pores; weak, medium and coarse, platy structure; firm when moist, sticky and very plastic when wet; few fine roots; many fine and medium pores; calcareous.

The B horizon ranges from silty clay loam to clay but is generally silty clay. The percentage of clay generally is between 40 and 55 percent but ranges from 35 to 60 percent. Substratum clays are dark gray to dark brown. In the solum the reaction ranges from less than pH 5.0 to pH 6.8. The underlying C horizon is calcareous. In places it contains small amounts of shale, glacial till, or stratified fine sand.

ILION SERIES

The Ilion series consists of moderately fine textured, poorly drained soils that developed in calcareous glacial till of late Wisconsin age. This till is dominated by dark shale and some limestone, sandstone, and crystalline rocks. The dark shale is dominant and contributes to the dark colors and the rather high content of clay.

These soils are in the same drainage sequence as the well drained and moderately well drained Mohawk soils and the poorly drained and very poorly drained Lyons soils. Ilion soils are similar to the Chippewa soils, which developed on material dominated by acid sandstone, but Ilion soils are finer textured, lack a fragipan, and have higher lime status. They are finer textured, darker colored, and wetter than Appleton soils.

Ilion soils are nearly level in most places, and they occur on slightly concave slopes in the uplands of the northern part of the county. Slopes are generally 1 to 5 percent, but they are more than 15 percent in some seep spots. The vegetation consists of soft maple, elm, willow, alder, and other water-tolerant trees.

Typical profile of an Ilion silt loam on a slope of 5 percent (in a hayfield):

Ap—0 to 10 inches, very dark grayish-brown (10YR 3/2) silt loam that has very dark gray (10YR 3/1) coatings on ped faces; moderate, very fine and fine, subangular

blocky structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine and medium roots; many fine pores; neutral; abrupt, smooth boundary. Horizon is 6 to 10 inches thick.

A2g—10 to 17 inches, olive-gray (5Y 4/2) silt loam that has common, fine, distinct mottles of strong brown (7.5YR 5/8); weak, thin and medium, platy structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many fine pores; neutral; clear, wavy boundary. Horizon is 0 to 10 inches thick.

IIB21tg—17 to 24 inches, dark-gray (5Y 4/1) silty clay loam that has medium, continuous, light-gray (N 7/0) to gray (N 6/0) clay films on ped faces and in pores; 30 percent of horizon covered by many, medium, distinct mottles of yellowish brown (10YR 5/6); weak, medium to coarse, prismatic structure that breaks to weak, thick, platy structure; firm when moist, sticky and plastic when wet; many fine roots; common fine pores; horizon is 5 percent gravel, by volume; neutral; clear, wavy boundary. Horizon is 1 to 12 inches thick.

IIB22tg—24 to 34 inches, dark grayish-brown (2.5Y 4/2) silty clay loam that has medium, discontinuous, gray (N 5/0) clay films on ped faces and in pores; 30 percent of horizon covered by medium, distinct mottles of strong brown (7.5YR 5/8) and light olive brown (2.5Y 5/4); weak, coarse, subangular blocky structure; firm when moist, sticky and plastic when wet; few fine roots; common fine pores; horizon is 5 to 10 percent gravel, by volume; neutral; clear, wavy boundary. Horizon is 4 to 13 inches thick.

IIC—34 to 50 inches +, olive-brown (2.5Y 4/4) silty clay loam that has thick, continuous, gray (5Y 5/1) lime films on horizontal ped faces and in pores; moderate, thin and medium, platy structure; firm when moist, slightly sticky and plastic when wet; no roots; common medium pores; black (5YR 2/1) stains that appear to be manganese; horizon is 10 to 15 percent gravel, by volume; calcareous.

The surface layer has a hue of 10YR or 5Y, value of 2 or 3, and chroma of 1 or 2. Generally an A2g horizon is below the surface layer, but in some places this horizon is masked by organic matter and forms part of the surface layer. If present, the A2g horizon has a hue of 5Y or 2.5Y, value of 4 or 5, and chroma of 1 or 2. It is distinctly mottled. Mottles are common in root channels in the A1 or Ap horizon. Texture of the A2g horizon ranges from silt loam to loam.

The B2t horizon has a hue of 5Y or 2.5Y, value of 4 or 5, and chroma of 1 or 2. Mottles cover less than 40 percent of the B2t horizon; they are common to many, medium to coarse, and distinct to prominent. They have a hue of 10YR or 7.5YR, value of 4 or 5, and chromas of 4 to 8. In most places a chroma of 1 is dominant in the A and B horizons. Texture of the B horizon ranges from silty clay loam to shaly silty clay loam, and commonly the content of clay ranges from 28 to 35 percent. Structure of the B2t horizon ranges from weak to moderate and from medium to coarse; it is prismatic that breaks to subangular blocky and angular blocky. Ped surfaces in the B2t horizon are commonly coated with light gray to gray (N 6/0 to N 5/0) clay films. The B2t horizon is firm to friable when moist and slightly sticky and slightly plastic when wet.

Underlying the B2t horizon is a C horizon that has a hue of 2.5Y or 5Y, value of 4 or 5, and chromas of 1 to 4. It is mottled in places. The C horizon generally has weak, medium, platy structure. Texture ranges from loam to silty clay loam, and the horizon is calcareous.

Reaction of the solum ranges from pH 6.4 to pH 6.8. Pebbles, shale fragments, and stones range from nearly none to 30 to 40 percent of a horizon, by volume.

LAKEMONT SERIES

The Lakemont series consists of poorly drained and very poorly drained soils that developed on calcareous, reddish-brown, glaciolacustrine clays.

These soils are the wettest members of a drainage sequence that includes the well drained and moderately well drained Schoharie soils and the somewhat poorly drained Odessa soils. Lakemont soils are similar to the Madalin soils but developed from reddish-brown sediments rather than from gray sediments.

Lakemont soils are nearly level to gently sloping and occur on lake plains. In some places they are in depressions of dissected areas of the plains. The native vegetation consists of red maple, elm, ash, and some sugar maple, beech, and oak.

Typical profile of a Lakemont silty clay loam on a slope of 5 percent (in a hayfield):

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silty clay loam; strong, very fine, subangular blocky structure; friable when moist, sticky and plastic when wet; abundant fine roots; many pores between peds; medium acid; abrupt, smooth boundary. Horizon is 4 to 10 inches thick.

A2g—8 to 11 inches, light brownish-gray (10YR 6/2) silty clay loam that has common, medium, prominent mottles of strong brown (7.5YR 5/8); moderate, medium and thick, platy structure; firm when moist, sticky and plastic when wet; common fine roots; common fine pores; few pebbles less than one-fourth inch in diameter; medium acid; abrupt, irregular boundary. Horizon is 0 to 9 inches thick.

B21tg—11 to 22 inches, reddish-gray (5YR 5/2) silty clay ped interiors that contain many, medium, distinct mottles of brown to dark brown (7.5YR 4/4) and few to common, distinct mottles of gray (5YR 5/1); variegated gray (5YR 5/1) and black (5YR 2/1) pattern on ped faces; strong, medium and coarse, prismatic structure that breaks to strong, medium and coarse, angular blocky structure; firm when moist, very sticky and very plastic when wet; common fine roots in cracks between peds; few fine roots in interiors of peds; few, very fine and fine pores in peds; common medium and coarse pores between peds; moderately thick, continuous clay films on vertical and horizontal faces of peds and in pores; some manganese patches; a few pebbles; slightly acid; clear, wavy boundary. Horizon is 4 to 16 inches thick.

B22tg—22 to 42 inches, brown to dark-brown (7.5YR 4/4) ped interiors of silty clay, dark gray (5YR 4/1) on vertical ped faces, brown (7.5YR 5/2) on horizontal ped faces; moderate, coarse, prismatic structure that breaks to moderate, medium and thick, platy structure; firm when moist, sticky and very plastic when wet; few fine roots in ped interiors; few medium roots between peds; few very fine tubular pores, common fine pores between peds; moderately thick, continuous clay films on vertical ped faces; thin, continuous clay films on horizontal ped faces and in pores; neutral; clear, wavy boundary. Horizon is 6 to 16 inches thick.

Cg—42 to 48 inches +, reddish-brown (5YR 4/4) silty clay peds that have gray (5YR 5/1) clay films; weak, coarse, prismatic structure that breaks to weak, medium and thick, platy structure; firm when moist, very sticky and very plastic when wet; few fine roots; few, very fine and fine pores; thin, continuous clay films on horizontal and vertical ped faces; moderately thick clay films in pores and old root channels; upper part of horizon has pinkish-gray (5YR 6/2) streaks and splotches of lime 2 to 5 millimeters wide, lower part of horizon has streaks and splotches as much as 10 millimeters wide; clay reaction is neutral; streaks and splotches are violently effervescent with cold dilute hydrochloric acid.

Texture of the surface layer is generally silty clay loam but in places is silt loam. Mucky silt loam and mucky silty clay loam occur in some very poorly drained areas. Below the plow layer, the content of clay generally is between 35 and 60 percent. The parent material is silt and clay.

The plow layer has a hue of 10YR, value of 3, chroma of 1 or 2, and it is mottled in places. The mottles are along root channels. The rest of the solum has colors mostly with a hue of 5YR or 7.5YR, but in places layers with a hue of 10YR or 2.5Y occur. Values in the solum are 4 and 5, and chromas range from 0 through 4. Peds in the solum are generally coated with gray films of silt or clay. The C horizon is reddish brown and gray.

Structure in the plow layer ranges from strong and moderate, very fine and medium, granular to strong, fine, subangular blocky. Structure in the rest of the solum is weak to strong, medium and coarse, prismatic that breaks to weak to strong, medium, angular blocky. In many places the underlying material has weak platy structure.

Reaction ranges from medium acid to neutral. Depth to calcareous material ranges from 24 to 48 inches.

LANGFORD SERIES

The Langford series consists of medium-textured, moderately well drained soils that have a fragipan. These soils formed in late Wisconsin till that was derived from dark-colored shale and sandstone and some limestone and crystalline rocks.

The only catenary associates of Langford soils in Schoharie County are the somewhat poorly drained Erie soils. Langford soils are similar to the Nunda soils but are coarser textured and have a fragipan. They are also similar to the Mardin soils but are less acid in the fragipan.

Langford soils are on drumlinlike hills in the northern part of the county. The native vegetation is forest consisting mainly of sugar maple, beech, and hemlock.

Typical profile of a Langford channery silt loam on a slope of 9 percent (in a hayfield):

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) channery silt loam; strong, fine, granular structure; friable when moist, slightly sticky and slightly plastic when wet; many fine roots; slightly acid; abrupt, smooth boundary. Horizon is 4 to 10 inches thick.

B2—10 to 15 inches, yellowish-brown (10YR 5/4) channery silt loam; weak, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; many fine roots; 25 to 30 percent of horizon, by volume, is coarse fragments of sandstone; strongly acid; abrupt, wavy boundary. Horizon is 5 to 12 inches thick.

A'2—15 to 20 inches, grayish-brown (2.5Y 5/2) to light olive-brown (2.5Y 5/4) channery loam that has few, medium, distinct mottles of yellowish brown (10YR 5/6); weak, very fine to medium, platy structure; firm in place when moist, slightly sticky and slightly plastic when wet; few fine roots; many, very fine and fine, random tubular pores; very thin patchy films in pores; 15 to 25 percent of horizon, by volume, is coarse fragments of sandstone; medium acid; clear, wavy boundary. Horizon is 4 to 6 inches thick.

B'x—20 to 42 inches +, dark grayish-brown (2.5Y 4/2) to olive-brown (2.5Y 4/4) channery silt loam that has many, medium, distinct mottles that are mostly yellowish brown (10YR 5/6) but have grayish-brown (2.5Y 5/2) centers; weak, medium, platy structure; very firm when moist, slightly sticky and slightly plastic when wet; brittle; few fine roots in upper part; many, very fine and fine, random tubular pores; very thin patchy clay films in pores; slightly acid in upper part to neutral at depth of 42 inches.

Texture of the surface layer and the color B horizon is mostly channery silt loam but in places is channery loam. The fragipan is mostly channery silt loam or loam. Most coarse fragments are sandstone and siltstone, but there are small amounts of limestone and crystalline rocks. Coarse fragments occupy 10 to 40 percent of the soil, by volume.

In color the surface layer has hues of 2.5Y and 10YR, values of 2 to 4, and chromas of 1 to 3. The color B horizon has hues of 10YR and 2.5Y, values of 4 to 6, and chromas of 3 to 6. This horizon is mottled in the lower part in some places. The A'2 horizon has a hue of 2.5Y or 5Y, a value of 5, and a chroma of 4. This horizon has common, fine, distinct mottles. The fragipan has a hue of 2.5Y or 5Y, a value of 4 or 5, and a chroma of 3 or 4. This horizon has few to many, fine and medium, distinct and prominent mottles.

Structure in the surface layer is weak and moderate, fine, granular. Structure of the color B horizon is weak to moderate, very fine to fine, subangular blocky. The A'2 horizon has weak, fine to medium, platy structure. The fragipan is massive or has weak, very coarse, prismatic structure to weak, medium, platy structure.

Consistence above the fragipan is friable or very friable when moist and is nonsticky and nonplastic to slightly sticky and slightly plastic when wet. Consistence of the fragipan is firm to extremely firm.

Reaction ranges from less than pH 5.0 to pH 5.6 in the surface layer to pH 5.6 to pH 6.8 in the fragipan. Depth to carbonates ranges from 40 to 60 inches, and in most places the carbonates begin at the bottom of the solum.

LANSING SERIES

The Lansing series consists of well-drained soils that developed in calcareous till. The upper part of the solum is medium acid to strongly acid.

Lansing soils are in the same drainage sequence as the moderately well drained Conesus soils, the somewhat poorly drained Appleton soils, and the poorly drained and very poorly drained Lyons soils. They are similar to the high-lime Honeoye soils but are medium acid to strongly acid in the upper part of the column and have a thicker A2 horizon and solum.

Lansing soils are undulating to rolling and occur on the low plateau in the northern part of the county. Slopes are convex. The native vegetation is deciduous hardwood forest consisting mainly of sugar maple, beech, red oak, and white oak. White pine occurs in local areas.

Typical profile of a Lansing channery silt loam, on a slope of 11 percent (in an idle field):

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) channery silt loam; strong, very fine and medium, granular structure; friable when moist, slightly sticky and slightly plastic when wet; many fine roots; 15 to 20 percent horizon, by volume, is channery fragments, pebbles, and cobblestones; medium acid; abrupt, wavy boundary. Horizon is 6 to 10 inches thick.

A2—8 to 17 inches, yellowish-brown (10YR 5/4) channery silt loam; weak, very fine to medium, subangular blocky structure; slightly firm in place, friable when removed, slightly sticky and slightly plastic when wet; abundant medium roots; many, very fine to coarse, random tubular pores; 15 to 20 percent of horizon, by volume, is channery fragments, pebbles, and cobblestones; medium acid; clear, wavy boundary. Horizon is 5 to 10 inches thick.

B&A—17 to 30 inches, yellowish-brown (10YR 5/4) channery silt loam; thin, continuous, dark grayish-brown (10YR 4/2) clay films on ped faces and in pores; thick pale-brown (10YR 6/3) silty coatings on ped faces and in pockets in the upper 5 to 7 inches; moderate, fine and medium, subangular blocky structure; firm when moist, sticky and plastic when wet; common fine and medium roots; many, fine and medium, random tubular pores; 15 to 20 percent of horizon, by volume, is channery fragments, pebbles, and cobblestones; slightly acid; diffuse, wavy boundary. Horizon is 12 to 15 inches thick.

C—30 to 48 inches +, brown to dark-brown (10YR 4/3) and light brownish-gray (2.5Y 6/2) channery loam; colors are in about equal amounts; massive; material breaks into fine to coarse porous clods; very firm when moist, slightly sticky and slightly plastic when wet; few fine roots; many, very fine and fine, random tubular pores; 15 to 20 percent of horizon, by volume, is channery fragments, pebbles, and cobblestones; weakly calcareous.

Texture of the upper part of the solum is channery or gravelly loam or silt loam, and some areas are very stony. The B&A horizon is channery or gravelly loam and silt loam and has a content of clay ranging from 18 to 28 percent. Coarse fragments are estimated to make up 10 to 35 percent of the soil, by volume. They are channery fragments of sandstone and

siltstone and lesser amounts of limestone and crystalline rocks.

Color of the surface layer has a hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. The A2 horizon has a hue of 10YR or 2.5Y, values of 4 to 6, and chromas of 3 and 4. The B&A horizon has a hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4.

Structure ranges from strong and moderate, very fine, granular and subangular blocky in the surface layer to weak and moderate, fine and medium, subangular blocky and angular blocky in the B&A horizon.

Consistence of the solum ranges from friable to firm when moist to slightly sticky and slightly plastic to plastic when wet. The upper part of the solum is strongly acid or medium acid and the lower part is slightly acid or neutral. Depth to carbonates ranges from 30 to 35 inches.

LIMA SERIES

The Lima series consists of moderately well drained soils that developed from gray, highly calcareous Wisconsin till. The till is dominated by gray limestone and shale, but it contains varying amounts of sandstone and crystalline rocks.

Lima soils are in the same drainage sequence as the well-drained Honeoye soils, the somewhat poorly drained Appleton soils, and the poorly drained and very poorly drained Lyons soils. They are higher in lime and have a thinner solum than the similar Conesus soils, which occur with Lansing soils.

Lima soils are nearly level to gently sloping and occur on uplands in the northern part of the county. Slopes of 2 to 8 percent are common. The native vegetation consists of sugar maple, basswood, hickory, hophornbeam, and beech.

Typical profile of a Lima silt loam on a slope of 2 percent (in a hayfield):

Ap—0 to 12 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; many fine roots and few medium roots; many fine pores; limestone pebbles and shale chips make up 10 to 15 percent of horizon, by volume; neutral; abrupt, smooth boundary. Horizon is 6 to 12 inches thick.

A&B—12 to 15 inches, olive-brown (2.5Y 4/4) loam; thin, patchy, yellowish-brown (10YR 5/4) clay films and thin, brown (10YR 5/3) silt coatings on ped faces; pores lined with clay films; weak to moderate, fine, angular blocky structure; firm when moist, sticky and plastic when wet; plentiful fine roots; many fine pores; slightly acid; limestone pebbles and shale chips make up 10 to 15 percent of horizon, by volume; gradual, wavy boundary. Horizon is 2 to 4 inches thick.

B2t—15 to 21 inches, dark grayish-brown (2.5Y 4/2) silt loam; thin to medium, continuous, dark grayish-brown (2.5Y 4/2) clay films on ped faces and in pores; few, fine, faint mottles of yellowish brown (10YR 5/4); moderate, fine, angular blocky structure; firm when moist, sticky and plastic when wet; plentiful, very fine and fine roots; many fine pores; limestone pebbles and shale chips make up 10 to 15 percent of horizon, by volume; neutral; clear, smooth boundary. Horizon is 6 to 15 inches thick.

C—21 to 35 inches +, light olive-brown (2.5Y 5/4) gravelly loam that has common, fine, faint mottles of yellowish brown (10YR 5/4); weak, medium, subangular blocky structure; very firm when moist, slightly sticky and plastic when wet; few, very fine and fine roots; common fine pores; calcareous.

A thin A2 horizon occurs in some places and is faintly to distinctly mottled. The B2t horizon is 18 to 28 percent clay. Reaction of the solum ranges from pH 6.4 to pH 7.0. Depth to calcareous material ranges from 15 to 30 inches.

LORDSTOWN SERIES

The Lordstown series consists of moderately deep, well-drained soils that formed in thin glacial till dominated by dark-gray sandstone, siltstone, or silty shale. These soils are medium acid to strongly acid. They overlie sandstone and shale bedrock.

Lordstown soils are associated with the shallow Arnot soils, the well drained and moderately well drained Mardin soils, the somewhat poorly drained Volusia soils, and the poorly drained Chippewa soils. They are similar to the Farmington soils but have a lower base status and are deeper to bedrock. Lordstown soils resemble the well drained to moderately well drained Mardin soils, which have a well-expressed fragipan and are underlain by deep, firm glacial till. Shallow analogs of Lordstown soils are the Arnot soils; analogs in reddish-colored till are the Oquaga soils.

Lordstown soils occur on the high ridges and steep valley walls of the Allegheny Plateau in the southern part of the county. The native vegetation consists of beech, sugar maple, hemlock, oak, and white pine.

Typical profile of Lordstown channery silt loam on a slope of 6 percent (in a hayfield):

Ap—0 to 8 inches, brown to dark-brown (10YR 4/3) channery silt loam; moderate, fine, granular structure; very friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many fine pores; strongly acid; abrupt, smooth boundary. Horizon is 6 to 9 inches thick.

B2—8 to 21 inches, yellowish-brown (10YR 5/6) channery silt loam; massive that breaks to fine and medium subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many fine pores; medium acid; abrupt, wavy boundary. Horizon is 10 to 20 inches thick.

B3—21 to 27 inches, light olive-brown (2.5Y 5/4) channery loam that has common, fine, distinct mottles of brown (7.5YR 4/4); thin, discontinuous, gray (2.5Y 5/1) silt coatings on ped faces; weak, thin and medium, platy structure; firm when moist, slightly sticky and slightly plastic when wet; few very fine roots; many fine pores; medium acid; abrupt, wavy boundary. Horizon is 0 to 8 inches thick.

R—27 to 31 inches +, sandstone bedrock.

In forested areas, the Ap horizon is replaced by O1, O2, and A1 horizons. The A1 horizon is generally only 2 to 3 inches thick and is black (10YR 2/1). In places, the thin A1 horizon is underlain by a thin, light-gray A2 horizon. The Ap horizon has a hue of 10YR, value of 3 or 4, and chroma of 2 or 3.

The B horizon generally has a hue of 10YR, but its hue ranges to 2.5Y in dark-colored till. In many places a mottled B3 horizon occurs just above the bedrock and is about 3 to 7 inches thick.

A C horizon occurs in some places and has a hue of 2.5Y. Depth to bedrock ranges from 20 to 40 inches. The boundary between the weathered soil material and the hard bedrock is abrupt or gradual, depending on the kind of bedrock. If the bedrock is shale, the boundary is gradual because it contains a considerable amount of shale fragments mixed with soil material. The boundary is more abrupt between the sandstone and the weathered soil material.

Where unlimed, the reaction of these soils ranges from pH 5.0 to pH 5.6.

LYONS SERIES

The Lyons series consists of poorly drained and very poorly drained soils that developed on calcareous glacial till. This till was dominated by limestone, shale, sandstone, and small amounts of crystalline rocks.

Lyons soils are in the same drainage sequence as the well drained Honeoye soils, the moderately well drained Lima soils, and the somewhat poorly drained Appleton soils.

Also, they are wet associates of Lansing soils. They are similar to the Ilion soils but are coarser textured and contain less shale.

Lyons soils occur on uplands in the northern part of the county. They are generally nearly level or depressional but in seep spots are steep. The native vegetation is forest consisting of soft maple, elm, ash, willow, alder, and other water-tolerant trees.

Typical profile of a Lyons silt loam on a slope of 6 percent (in an idle field):

Ap—0 to 6 inches, very dark brown (10YR 2/2) silt loam; moderate, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many fine pores; medium acid; abrupt, wavy boundary. Horizon is 3 to 6 inches thick.

A1—6 to 10 inches, black (10YR 2/1) silt loam that has few, fine, distinct mottles of dark reddish brown (5YR 3/4) in root channels; moderate, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many fine pores; medium acid; abrupt, wavy boundary. Horizon is 2 to 4 inches thick.

IIB21g—10 to 18 inches, light brownish-gray (2.5Y 6/2) fine sandy loam that has many, medium, distinct mottles of yellowish brown (10YR 5/6); massive that breaks to weak, fine, subangular blocky structure; firm when moist, nonsticky and nonplastic when wet; few fine roots; many fine pores; medium acid; abrupt, irregular boundary. Horizon is 4 to 10 inches thick.

IIIB22g—18 to 32 inches, gray (5Y 5/1) gravelly silt loam that has many, medium, prominent mottles of yellowish brown (10YR 5/6); very thin, discontinuous, gray (N 5/0) silt coatings in pores; massive that breaks to fine and medium subangular blocky structure; firm when moist, nonsticky and slightly plastic when wet; few fine roots; many fine pores; slight efferverscence with cold dilute hydrochloric acid. Horizon is 9 to 15 inches thick.

IIICg—32 inches +, light brownish-gray (10YR 6/2), highly calcareous gravelly silt loam glacial till.

The surface layer ranges from black (10YR 2/1) and very dark brown (10YR 2/2) to very dark gray (10YR 3/1) in color and from silt loam to channery silt loam or gravelly silt loam in texture. Some areas are stony. In the wetter areas the surface layer is mucky. Structure of the A horizon is moderate to strong, medium, granular and subangular blocky.

The IIB21g horizon ranges from light brownish gray (10YR 6/2) to grayish brown (10YR 5/2) and is distinctly to prominently mottled. In texture it ranges from fine sandy loam to slit loam. Content of clay is 18 to 28 percent between depths of 10 and 40 inches.

Reaction in the solum ranges from pH 5.5 to pH 6.6. Depth to calcareous material ranges from 18 to 30 inches.

MADALIN SERIES

The Madalin series consists of poorly drained and very poorly drained soils that developed on calcareous glaciolacustrine clay and silt. The clay and silt are firm, are dark gray and olive brown, and contain thin lenses of very fine sand.

Madalin soils are in the same drainage sequence as the well drained and moderately well drained Hudson soils and the somewhat poorly drained Rhinebeck soils. Analogs that developed on red silt and clay are the Lakemont soils.

Madalin soils are level and depressional and occur on lake plains and in small basins in the uplands of the county. The native vegeation consists of American elm, red maple, willow, alder, red-ozier dogwood, and other water-tolerant trees and shrubs.

Typical profile of a Madalin silty clay loam on a slope of 2 percent (in a hayfield):

Ap—0 to 6 inches, silty clay loam that is very dark gray (10YR 3/1) when moist and broken but is gray (10YR 5/1) when dry and crushed; common, fine, distinct mottles of yellowish red (5YR 4/6); strong, very fine and fine, granular structure and strong, very fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; fine roots abundant; common, fine and medium pores; slightly acid; smooth boundary. Horizon is 4 to 8 inches thick.

B21tg—6 to 11 inches, dark grayish-brown (10YR 4/2) silty clay; peds coated with very thin gray (10YR 5/1) clay films; few medium mottles of yellowish brown (10YR 5/6); weak, coarse, prismatic structure that breaks to moderate, medium, angular blocky structure; firm when moist, sticky and plastic when wet; common fine roots; few fine pores; slightly acid; abrupt, wavy boundary. Horizon is 0 to 7 inches thick.

B22tg—11 to 20 inches, dark grayish-brown (10YR 4/2) silty clay; peds coated with very thin, continuous, gray (N 5/0) clay films; many (30 percent), medium, prominent mottles of yellowish red (5YR 5/8); weak, coarse, prismatic structure that breaks to moderate, medium, angular blocky structure; firm when moist, sticky and plastic when wet; common fine roots; few fine pores; very thin continuous silt linings in pores; slightly acid; abrupt, wavy boundary. Horizon is 5 to 8 inches thick.

B23tg—20 to 30 inches, gray (5Y 5/1) silty clay; peds coated with thin, continuous, gray (N 5/0) clay films; common, medium, distinct mottles of yellowish brown (10YR 5/6); weak, coarse, prismatic structure that breaks to strong, medium, angular blocky structure; firm when moist, sticky and plastic when wet; few fine roots; common fine pores; thin, continuous, gray (N 5/0) silt linings in pores; neutral. Horizon is 5 to 15 inches thick.

Cg—30 inches +, gray (5Y 5/1) silty clay and some coarser textured strata; firm; calcareous.

Texture of the Ap horizon is mostly silty clay loam but in places is silt loam. This layer is dark colored, owing to its high content of organic matter. It has moderate to strong, medium, granular structure or moderate, fine, subangular blocky structure.

The B horizon has hues of 10YR, 2.5Y, and 5Y, values of 4 to 6, and chromas of 0 to 2. In most places the lower B horizon is gray (N 4/0 or N 5/0). The B horizon ranges from silty clay loam to clay, and it contains thin lenses of very fine sand in some places. Consistence of the B horizon is firm to very firm when moist and is sticky and plastic to very sticky and very plastic when wet.

The C horizon generally is gray (5Y 5/1 and N 5/0) and is calcareous. In places these soils are underlain by glacial till or bedrock at a depth of 24 to 48 inches and the C horizon is missing.

Reaction of the solum ranges from pH 5.8 to pH 6.8.

MARDIN SERIES

The Mardin series consists of medium-textured, moderately well drained and well drained soils that have a strongly acid fragipan. These soils developed on firm, medium-textured, olive-colored glacial till that was dominated by fine-grained sandstone and shale.

Mardin soils are in the same drainage sequence as the somewhat poorly drained Volusia soils and the poorly drained Chippewa soils. They are analogs of the Culvers and Cattaraugus soils, which developed in reddish-colored till. The Mardin soils are more acid in the fragipan than the Langford soils.

Mardin soils are undulating to steep and occur on uplands of the high plateau in the southern part of the county. The native vegetation is forest consisting mainly

of sugar maple, beech, hemlock, and some oak, hickory, and ash. White pine grows in some places.

Typical profile of a Mardin channery silt loam on a slope of 15 percent (in an idle field):

Ap—0 to 6 inches, brown (10YR 5/3) channery silt loam; moderate, fine, granular structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many fine and medium pores; coarse fragments make up 15 to 20 percent of the soil mass, by volume; strongly acid; abrupt, smooth boundary. Horizon is 3 to 6 inches thick.

B2—6 to 18 inches, yellowish-brown (10YR 5/6) channery silt loam; weak, very fine and fine, granular structure; friable when moist, nonsticky and slightly plastic when wet; plentiful fine roots; very fine and medium pores; coarse fragments make up 15 to 20 percent of the soil mass, by volume; very strongly acid; abrupt, wavy boundary. Horizon is 9 to 20 inches thick.

A'2—18 to 22 inches, grayish-brown to light olive-brown (2.5Y 5/4) channery silt loam that has common, fine and medium, faint mottles of yellowish brown (10YR 5/6); weak, thin, platy structure; firm and brittle when moist, nonsticky and slightly plastic when wet; few fine roots; common very fine pores; coarse fragments make up 30 to 40 percent of the soil mass, by volume; strongly acid; abrupt, irregular boundary. Horizon is 1 to 4 inches thick.

B'x—22 to 56 inches, olive-brown (2.5Y 4/4) channery silt loam that has common, fine and medium, faint mottles of yellowish brown (10YR 5/6); weak, coarse, prismatic structure that breaks to fine and medium, angular blocky structure; cracks between polygons filled with gray (5Y 5/1) silt that is ringed with strong brown (7.5YR 5/8) adjacent to the polygon faces; extremely firm and brittle when moist, slightly sticky and slightly plastic when wet; no roots; common fine and very fine pores; very thin continuous clay films in pores; coarse fragments make up 30 to 40 percent of the soil mass, by volume; strongly acid; diffuse, wavy boundary. Horizon is 30 to 40 inches thick.

Cx—56 to 60 inches +, dark grayish-brown to olive-brown (2.5Y 4/4) very channery silt loam that has few, fine, faint mottles of dark yellowish brown (10YR 4/4); weak, medium, platy structure; very firm and brittle when moist, slightly sticky and slightly plastic when wet; no roots; very fine, fine, and medium pores common; thin continuous clay films in pores; slightly acid.

The Ap horizon ranges from very dark grayish brown (10YR 3/2) to yellowish brown (10YR 5/4). In some places there is a light yellowish-brown (2.5Y 6/4) A2 horizon 1 to 6 inches thick.

The B horizon has a hue of 2.5Y and 10YR, values of 3, 4, and 5, and chromas of 3 to 5. In some places the B horizon is not mottled in the lower part. An A'2 horizon is generally found above the fragipan, but in a few places it is hard to detect from the overlying B horizon.

The fragipan has a hue of 2.5Y or 5Y, a value of 4 or 5, and a chroma of 3 or 4. It may have a few faint mottles in the upper part. Consistence of the fragipan is extremely firm and brittle when moist and is nonsticky and nonplastic to slightly sticky and slightly plastic when wet. The fragipan has weak to moderate, coarse to very coarse, prismatic structure. Reaction of the fragipan ranges from pH 5.0 to pH 5.5. Depth to the fragipan ranges from 18 to 30 inches.

The soils are stony in tilled areas but are very stony or extremely stony in areas where no stones have been removed.

MIDDLEBURY SERIES

The Middlebury series consists of moderately well drained soils that developed in slightly acid and strongly acid alluvium that was deposited recently. This alluvium was washed from soils that formed in material dominated by gray sandstone and shale.

Middlebury soils are in the same drainage sequence as the well-drained Tioga soils, the somewhat poorly drained and poorly drained Holly soils, and the very poorly drained Papakating soils. They are similar to the Basher soils, which developed from red instead of gray alluvium.

Middlebury soils occur on bottom lands in the major valleys of the county. The native vegetation consists mainly of poplar, willow, elm, soft maple, sycamore, and beech.

Typical profile of a Middlebury silt loam on a slope of 2 percent (in a pasture):

Ap—0 to 7 inches, dark-brown (10YR 3/3) silt loam; moderate, fine, granular structure; friable when moist, slightly sticky and plastic when wet; abundant fine roots; strongly acid; abrupt, smooth boundary. Horizon is 4 to 10 inches thick.

B21—7 to 18 inches, dark yellowish-brown (10YR 4/4) silt loam that is slightly darker in the upper part; weak, fine, subangular blocky structure; friable when moist, sticky and plastic when wet; abundant fine roots; strongly acid; clear, wavy boundary. Horizon is 6 to 24 inches thick.

IIB22—18 to 24 inches, dark grayish-brown (2.5Y 4/2) gravelly loam that has common, fine, faint mottles of dark yellowish brown (10YR 4/4); weak, very fine, subangular blocky structure; friable when moist, sticky and plastic when wet; few fine roots; strongly acid; clear, wavy boundary. Horizon is 4 to 6 inches thick.

IIIC3—24 to 35 inches +, olive-gray (5Y 5/2) gravelly sandy loam that has common, fine, distinct mottles of dark yellowish brown; single grain; friable when moist, slightly sticky and slightly plastic when wet; few fine roots; strongly acid but grades to medium acid as depth increases.

The A horizon ranges from very dark grayish brown (10YR 3/2) to brown or dark brown (10YR 4/3). It is generally silt loam but in places is gravelly loam. The B and C horizons are stratified and range from silt loam to very gravelly sandy loam. Between depths of 10 and 40 inches, the average content of clay is 18 percent, which is somewhat higher than is normal for the series. Mottling caused by waterlogging commonly occurs at a depth of 15 to 24 inches. Reaction ranges from pH 5.4 to pH 6.4.

MOHAWK SERIES

The Mohawk series consists of well drained to moderately well drained soils that developed in calcareous glacial till. Dominant in this till are very dark brown to black calcareous shale and some sandstone.

The Mohawk soils are in the same drainage sequence as the poorly drained Ilion soils, which are their only drainage associates in Schoharie County. They are similar to the Honeoye soils but are darker colored throughout the profile and generally have a finer textured C horizon. Mohawk soils have a less acid solum than the Lansing soils, and they contain more dark shale.

Mohawk soils are undulating to moderately steep and occur in the uplands of the northern part of the county. The native vegetation is mainly hardwood forest in which sugar maple and beech are dominant.

Typical profile of a Mohawk silt loam on a slope of 9 percent (in an alfalfa field):

Ap—0 to 6 inches, silt loam that is very dark grayish brown (10YR 3/2) when moist and crushed and is grayish brown (10YR 5/2) when dry and crushed; weak, fine, subangular blocky structure and moderate, fine, granular structure; friable when moist, slightly sticky and slightly plastic when wet; abundant, fine and medium roots; many fine pores; slightly acid; abrupt, smooth boundary. Horizon is 4 to 10 inches thick.

B1—6 to 12 inches, dark grayish-brown (10YR 4/2) silt loam; strong, fine, angular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; abundant, fine and medium roots; many fine pores; very thin, very dark grayish-brown (10YR 3/2) coatings of organic matter on ped faces; neutral; clear, wavy boundary. Horizon is 0 to 7 inches thick.

B21t—12 to 20 inches, dark grayish-brown (10YR 4/2) silt loam with very thin, continuous, very dark grayish-brown (10YR 3/2) clay films on ped faces and in pores; strong, fine, angular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; plentiful, fine and medium roots; many, very fine and fine pores; neutral; clear, wavy boundary. Horizon is 7 to 14 inches thick.

B22t—20 to 41 inches, dark grayish-brown (10YR 4/2) silty clay loam with thin, continuous, very dark brown (10YR 2/2) films on ped faces and in pores; few, fine, distinct mottles of yellowish brown (10YR 5/4); weak, medium, prismatic structure that breaks to strong, fine and medium, angular blocky structure; firm when moist, slightly sticky and plastic when wet; plentiful fine roots; many, very fine and fine pores; neutral; clear, wavy boundary. Horizon is 11 to 22 inches thick.

IIC—41 to 44 inches +, very dark grayish-brown (10YR 3/2) cobbly silt loam; weak, medium, platy structure; firm when moist, slightly sticky and slightly plastic when wet; no roots; many fine pores; coarse fragments of limestone and dark shale make up 30 percent of the soil mass, by volume; strong effervescence with cold dilute hydrochloric acid.

The Ap horizon is commonly very dark grayish brown (10YR 3/2), but it ranges from very dark brown (10YR 2/2) to dark brown (10YR 3/3). It is silt loam or channery silt loam in most places but ranges from loam to silty clay loam. Consistence is generally friable when moist and is slightly sticky and slightly plastic when wet. In the areas of heavier textured soil, consistence is slightly sticky and plastic when wet. In a few places, the surface layer is underlain by a weakly developed A2 horizon.

The B horizon generally has a hue of 10YR or 2.5Y, a value of 3 or 4, and a chroma of 2. In a few places, however, value approaches 6 and chroma is 3. Texture of the subsoil is mostly silt loam or silty clay loam but ranges to loam. The content of clay in the B horizon ranges from 18 to 35 percent. Consistence is friable to firm when the B horizon is moist and is slightly sticky and slightly plastic to sticky and plastic when it is dry.

The C horizon has a hue of 10YR or 2.5Y, a value of 3 or 4, and a chroma of 2. Structure of this horizon is generally weak, medium, and platy. Mottling is distinct below a depth of 20 inches. The content of coarse fragments varies considerably. Limestone and shale fragments make up 10 to 40 percent of the C horizon, by volume.

Reaction of the solum ranges from pH 5.5 to pH 7.0.

MORRIS SERIES

The Morris series consists of somewhat poorly drained, medium-textured soils that have a well-developed fragipan. These soils formed in firm reddish till that was dominated by red acid sandstone and shale.

Drainage associates of the Morris soils are the well drained Cattaraugus soils, the moderately well drained Culvers soils, and the poorly and very poorly drained Norwich soils. Morris soils are similar to Culvers soils but have mottles within a depth of 16 inches. They are similar to Norwich soils but have chromas greater than 2 in the B horizon and faint mottling in the upper 16 inches. Morris soils are the red analogs of the gray Volusia soils.

Morris soils have a uniform to slightly concave surface and are on upland slopes of 2 to 15 percent in the Allegheny Plateau in the southern part of the county. The native vegetation is forest consisting of red maple, hemlock, ash, and some oak and white pine.

Typical profile of a Morris stony silt loam on a slope of 5 percent (in a hayfield):

Ap—0 to 7 inches, brown to dark-brown (7.5YR 4/2) stony silt loam; weak, medium and fine, granular structure; very friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; strongly acid; abrupt, smooth boundary. Horizon is 4 to 10 inches thick.

B2—7 to 13 inches, reddish-brown (5YR 4/4) stony silt loam with common, medium, faint mottles of strong brown (7.5YR 5/6); weak, medium, granular structure; friable when moist, slightly sticky and slightly plastic when wet; plentiful fine roots; coarse fragments make up 30 percent of the soil mass, by volume; strongly acid; clear, wavy boundary. Horizon is 4 to 8 inches thick.

A′2—13 to 15 inches, light reddish-brown (5YR 6/3) channery loam with many, distinct, medium mottles of strong brown (7.5YR 5/8); weak, medium, platy structure; slightly firm when moist; few fine roots; strongly acid; abrupt, irregular boundary. Horizon is 2 to 5 inches thick.

B′x1—15 to 24 inches, reddish-brown (5YR 4/3) channery loam with common, faint mottles of reddish gray (5YR 5/2) and dark brown (7.5YR 4/4); very weak, coarse, subangular blocky structure within prisms that measure 12 to 24 inches across; prisms surrounded by vertical silty streaks with pinkish-gray (5YR 6/2) centers and strong-brown (7.5YR 5/6) borders; very firm when moist; thin discontinuous clay films in pores; few fine roots between prisms; strongly acid; diffuse, wavy boundary. Horizon is 8 to 14 inches thick.

B′x2—24 to 48 inches, reddish-brown (5YR 5/3) to dark reddish-gray (5YR 4/2) channery loam; very weak, thick, platy structure within prisms that measure 12 to 24 inches across; silty streaks surround the prisms as in the horizon above but dissipate irregularly with depth; extremely firm and brittle when moist; thin clay films in pores; few fine roots between prisms; medium acid; diffuse, wavy boundary. Horizon is 21 to 28 inches thick.

Cx—48 to 60 inches +, dark reddish-brown (5YR 3/3) channery loam; weak, thick, platy structure; extremely firm when moist; no roots; medium acid.

The Ap horizon generally has a hue of 7.6YR, a value of 3 or 4, and a chroma of 2, 3, or 4. In some places, the hue is 5YR. Texture of the plow layer is channery silt loam to very channery and gravelly loam; stony or very stony phases are dominant. Mottling occurs at a depth of 7 to 8 inches.

The B2 horizon has a hue of 5YR or 2.5YR, a value of 4, and chromas of 2 through 4. This horizon is stony silt loam or loam. In most places an A′2 horizon occurs above the fragipan and has a hue of 2.5YR or 5YR, a value of 5 or 6, and chromas of 1 through 3. Content of clay ranges from 8 to 17 percent.

The fragipan has hues of 2.5YR, 5YR, and 7.5YR, values of 4 to 6, and a chroma of 2 or 3. It generally has a channery silt loam texture but ranges to channery loam. In a few places, the solum is underlain by a reddish-brown (5YR 4/3) layer of firm silty clay loam.

Reaction of the solum ranges from pH 5.4 to 6.0. Areas that have not had stones removed range from very stony to extremely stony.

NASSAU SERIES

The Nassau series consists of well-drained, medium-textured shaly soils that are shallow to shale bedrock. These soils developed on a thin layer of glacial till that contained a large amount of acid shale fragments.

Nassau soils are mainly associated with the Lordstown, Arnot, and Mardin soils. Nassau soils are similar to the Arnot soils, but Arnot soils developed on sandstone and shale bedrock and do not have such a high content of shale fragments.

Nassau soils are moderate to steep and occur in areas of shale outcrops. The vegetation consists of sugar maple, beech, and some white pine and hemlock.

Typical profile of a Nassau shaly silt loam on a slope of 10 percent (in a hayfield):

Ap—0 to 7 inches, very dark grayish-brown (10YR 4/2) shaly silt loam; weak, very fine, granular structure; friable when moist, nonsticky and slightly plastic when wet; abundant fine roots; 20 percent of soil mass, by volume, is shale fragments; slightly acid; abrupt, smooth boundary. Horizon is 5 to 8 inches thick.

B21—7 to 10 inches, yellowish-brown (10YR 5/6) shaly silt loam; weak, very fine, granular and weak, very fine, subangular blocky structure; friable when moist, nonsticky and slightly plastic when wet; abundant fine roots; 20 to 30 percent of soil mass, by volume, is shale fragments; strongly acid; gradual, wavy boundary. Horizon is 2 to 6 inches thick.

B22—10 to 16 inches, yellowish-brown (10YR 5/4) very shaly silt loam; weak, very fine, subangular blocky structure; friable when moist, nonsticky and slightly plastic when wet; abundant fine roots; 50 to 60 percent of soil mass, by volume, is shale fragments; strongly acid; abrupt, wavy boundary. Horizon is 4 to 8 inches thick.

B3—16 to 20 inches, olive-brown (2.5Y 4/4) very shaly silt loam; very weak, very fine, subangular blocky structure between the shale fragments; friable when moist, nonsticky and slightly plastic when wet; plentiful fine roots; 50 to 60 percent of the soil mass, by volume, is shale fragments; most of the fragments are less than 1 inch long, but some large soft blocks that shatter very easily are as much as 1 foot across; strongly acid; abrupt, irregular boundary. Horizon is 0 to 6 inches thick.

R—20 inches +, black or very dark gray shale that has light brownish-gray (10YR 6/2) silt coatings on horizontal surfaces; the shale, when weathered, is rust colored; strongly acid.

The texture of the solum is mostly shaly or very shaly silt loam. Coarse fragments are mostly shale and constitute as much as 50 to 60 percent of some horizons.

The Ap horizon has a hue of 10YR or 2.5Y, values of 3 through 5, and chromas of 1, 2, and 3. The B2 horizon has a hue of 10YR, a value of 5 or 6, and chromas of 3 to 6.

Structure ranges from weak to moderate, very fine to fine, granular in the Ap horizon to weak to moderate, very fine to fine, subangular blocky in the underlying horizons.

Consistence ranges from friable to very friable when the soil is moist to nonsticky and slightly plastic to slightly sticky when it is wet.

Bedrock is at an average depth of 17 inches, but the depth to bedrock ranges from 10 to 20 inches. In unlimed areas the reaction is strongly acid to medium acid.

NORWICH SERIES

The Norwich series consist of poorly drained and very poorly drained soils that developed on firm glacial till. The glacial till was derived from red sandstone and shale.

Norwich soils are in the same drainage sequence as the well drained Cattaraugus soils, the moderately well drained Culvers soils, and the somewhat poorly drained Morris soils. They are analogs of the Chippewa soils, which developed on gray sandstone and shale. They are also similar to Morris soils but have a distinctly gleyed A2g horizon.

Norwich soils are in the uplands. They are generally nearly level or depressional but in seep spots are steep. The native vegetation is forest consisting mainly of red maple, elm, ash, hemlock, and alder. Cleared areas are mainly in sedges and rushes.

Typical profile of a Norwich stony silt loam on a slope of 14 percent (in a pasture):

A1—0 to 3 inches, dark reddish-brown (5YR 3/3) stony silt loam; moderate, very fine and medium, granular structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; fine and medium pores; neutral; abrupt, irregular boundary. Horizon is ½ inch to 6 inches thick.

A2g—3 to 13 inches, weak-red (2.5YR 4/2) stony silt loam that has common, fine, distinct mottles of yellowish red (5YR 5/8); weak, fine and medium, angular blocky structure; firm when moist, slightly sticky and slightly plastic when wet; plentiful fine roots; very fine and medium, tubular pores; common, coarse pebbles and decomposed fragments of sandstone; fragments are brownish yellow (10YR 6/6 to 6/8) and pebbles are green; neutral; abrupt, wavy boundary. Horizon is 3 to 11 inches thick.

IIBxg—13 to 23 inches, brown (7.5YR 5/2) very gravelly loam that has many, medium, faint mottles of brown or dark brown (7.5YR 4/4) and common, medium, distinct mottles of light gray or gray (5Y 6/1) and strong brown (7.5YR 5/6); weak, medium, platy structure; extremely firm and brittle when moist, nonsticky and slightly plastic when wet; very few fine roots; very fine and fine tubular pores in upper 3 inches; thin, patchy films of silt or clay in pores; neutral; clear, wavy boundary. Horizon is 9 to 13 inches thick.

IICxg—23 to 42 inches +, reddish-gray (5YR 5/2) very gravelly loam that has common, medium, distinct mottles of brown or dark brown (7.5YR 4/4), light gray or gray (5YR 6/1), and strong brown (7.5YR 5/6); weak, medium, platy structure; firm and brittle when moist, nonsticky and slightly plastic when wet; no roots; few, very fine, random tubular pores; neutral.

The solum ranges from silt loam to loam and is mostly stony or gravelly; the content of clay ranges from about 18 to 27 percent.

The matrix, between depths of 6 and 30 inches, ranges from 2.5YR to 7.5YR in hue, has values of 3 to 5, and has a chroma of 1 or 2. Where these red soils are very poorly drained, they generally have a higher chroma than that in similar soils developed from gray material. Mottling starts at a depth of 1 to 6 inches, and 20 to 40 percent of the mottles have a high chroma.

Structure ranges from weak, fine and medium, angular blocky to moderate, coarse, prismatic and weak, medium, platy in the horizons underlying the surface layer.

Consistence ranges from friable when moist and slightly sticky and slightly plastic when wet in the surface layer to extremely firm when moist and nonsticky and slightly plastic when wet in the lower horizons. The Bx and Cx layers are brittle. Reaction ranges from pH 6.2 to pH 6.8. Some areas of these soils may have a black mucky surface layer as much as 10 inches thick.

NUNDA SERIES

The Nunda series consists of well drained to moderately well drained soils that developed from glacial till. The till was dominated by limestone and shale, and it contains a fairly large amount of lacustrine material. The upper part of these soils (Ap, A21 or color B, and A22 horizons) is a silty deposit that contrasts with the underlying moderately fine textured material from the glacial till.

Nunda soils occur with the somewhat poorly drained Burdett soils. They are similar to the Lansing soils but are finer textured in the lower horizons.

The Nunda soils occur on low moraines and drumlinlike hills in the northern part of the county. The native vegetation is forest consisting mainly of sugar maple, beech, and hickory.

Typical profile of a Nunda channery silt loam on a slope of 3 percent (in a hayfield):

Ap—0 to 8 inches, channery silt loam that is pale brown (10YR 6/3) when dry and broken, dark grayish brown (10YR 4/2) when moist and broken, and brown (10YR 4/3) when crushed and moist; moderate, medium and fine, granular structure; friable when moist; abundant fine roots; common earthworm channels; strongly acid; abrupt, smooth boundary. Horizon 3 to 10 inches thick.

A21—8 to 13 inches, channery silt loam that is yellowish brown (10YR 5/4) when crushed and moist and is pale brown (10YR 6/3) when broken and dry; topmost inch resembles a traffic pan and has weak, very thin, platy structure; this material digs out in medium and fine irregular fragments and subangular blocks that have distinct pressure faces on less than 25 percent of their surface; very friable when moist; plentiful fine roots; common vertical earthworm channels; medium acid; clear, wavy boundary. Horizon is 3 to 9 inches thick.

A22—13 to 16 inches, light olive-brown (2.5Y 5/3) channery silt loam with many coarse mottles of brownish gray (2.5Y 6/2), yellowish brown (10YR 5/4), and strong brown (7.5YR 5/6); when dry, the light-colored mottles are light gray; moderate, thin and very thin, platy structure in which light-colored mottles are between the plates or form vertical cylinders that are ½ to 1½ inches across and that extend through the plates and are bounded by yellowish-red mottles; firm and slightly brittle when moist; plentiful fine roots; many fine tubular pores that have smooth interiors and appear to be root channels; peds have distinct pressure faces; medium acid; clear, wavy boundary. Horizon is 3 to 6 inches thick.

IIA&B—16 to 18 inches, light brownish-gray (2.5Y 6/2) and pale-brown (10YR 6/3) coarse silt loam with strong-brown (7.5YR 5/6), fine and medium mottles that occur as caps ½ to 2 inches thick on the tops of coarse and medium blocks and as thin coats extending down their sides; blocks have dark grayish-brown (10YR 4/2) channery heavy loam centers and common ½-millimeter vertical pores with smooth linings that do not appear to be clay; horizontal faces of blocks have an intricate network of microridges that appear to be sand and silt; sinuous channels and hemispherical microdepressions among them are smooth and some have thin clay films in the lower 1 inch; vertical faces are smooth; medium acid; clear, irregular boundary. Horizon is 1½ to 3 inches thick.

IIB2t—18 to 35 inches, dark grayish-brown (10YR 4/2) light channery clay loam that has gray (5Y 5/1) coatings of silt on ped faces; coatings range from a thin line to a width of 2 millimeters; moderate, medium and thick, platy structure with random vertical cleavage, marked by gray (5Y 5/1), across individual plates at intervals of ½ to more than 2 inches; plates break into medium and coarse blocks; firm in place, firm and slightly brittle if removed; very few fine roots; common but patchy clay films on vertical faces of peds; similar films on horizontal faces of peds, but they occupy half as much area; many fine tubular pores with clay linings; few vertical cleavage planes spaced more than 2 feet apart and extend halfway through the horizon; stones have distinct rippled clay films on their tops and bottoms and in fracture planes; neutral in upper part, mildly alkaline in lower part; clear, slightly wavy boundary. Horizon is 9 to 18 inches thick.

IIC—35 to 40 inches, dark grayish-brown (10YR 4/2) channery heavy loam or light clay loam that has common, coarse, gray (2.5Y 5/1) mottles and a few, medium, dark yellowish-brown (10YR 4/4) mottles; moderate, medium and thin, platy structure; firm in place and slightly firm if removed; no roots; common fine pores with smooth linings; distinct clay films on pebbles and large stones; thin patchy clay films on ped faces; calcareous; the most violent effervescence is in the light-gray mottles.

The Ap horizon is mostly brown or dark brown (10YR 4/3) and consists of channery or gravelly silt loam. Beneath the Ap horizon is an A21 that generally is yellowish brown (10YR 5/4) but in places has a hue of 2.5Y. The A21 or color B horizon is mottled. It ranges in texture from loam to silt loam. Underlying this horizon is an A22 or A'2 horizon that ranges from dark grayish brown (2.5Y 4/2) to olive (5Y 5/3) and has distinct or prominent mottles.

The IIB2t horizon is abruptly below the A22 horizon, and small tongues from the A22 extend into it. The IIB2t horizon ranges mainly from dark grayish brown (2.5Y 4/2) to olive brown (2.5Y 4/4). This horizon has common to many, fine to medium, distinct mottles below a depth of 20 inches. Peds in the IIB2t horizon are coated with thin, dark-gray (2.5Y 4/1) to gray (5Y 5/1) clay films. The IIB2t horizon is mostly clay loam, but in places it is silty clay loam. Content of clay ranges from about 28 to 35 percent. Where platy structure breaks, it ranges from weak and moderate, medium, angular blocky to weak and moderate, medium, subangular blocky.

Reaction ranges from pH 5.2 in the upper part of the solum to pH 6.8 in the finer textured substratum.

ODESSA SERIES

The Odessa series consists of somewhat poorly drained soils that developed from calcareous, reddish-brown to brown, glaciolacustrine silt and clay.

These soils are in the same drainage sequence as the well drained and moderately well drained Schoharie soils and the poorly drained and very poorly drained Lakemont soils. Odessa soils are similar to the Rhinebeck soils but have B and C horizons that are redder than the grayish-brown B and C horizons of Rhinebeck soils.

Odessa soils are nearly level to gently sloping and occur on lake plains, mainly in the Schoharie Valley. The native vegetation consists of sugar maple, red maple, basswood, black ash, red oak, and some beech, elm, and white pine.

Typical profile of an Odessa silty clay loam on a slope of 6 percent (in a hayfield):

Ap1—0 to 4 inches, dark-gray (10YR 4/1) silty clay loam; strong, very fine and fine, granular structure; friable when moist, sticky and plastic when wet; abundant fine roots; common fine pores; neutral; abrupt, smooth boundary. Horizon is 3 to 5 inches thick.

Ap2—4 to 9 inches, dark-gray (10YR 4/1) silty clay loam; strong, fine and medium, angular blocky structure; firm when moist, sticky and plastic when wet; abundant fine roots; common, medium and coarse pores; neutral; abrupt, smooth boundary. Horizon is 3 to 6 inches thick.

B21tg—9 to 16 inches, silty clay with brown or dark-brown (7.5YR 4/4) ped interiors and gray (10YR 5/1) ped faces that have few, medium, faint mottles of strong brown (7.5YR 5/6); moderate, coarse, prismatic structure that breaks to medium and coarse angular blocky structure; few pale-brown (10YR 6/3) silt coatings on surface of prisms in the upper part; firm when moist, sticky and plastic when wet; few fine roots; common, fine to coarse pores; thin, continuous, gray (10YR 5/1) clay films on ped faces and in pores; slightly acid; gradual, wavy boundary. Horizon is 6 to 13 inches thick.

B22tg—16 to 36 inches, silty clay with reddish-brown (5YR 4/4) ped interiors and reddish-gray (5YR 5/2) ped faces that have common, medium, faint mottles of strong brown (7.5YR 5/6); weak, coarse, prismatic structure that breaks to moderate, medium, angular blocky structure; firm when moist, sticky and plastic when wet; few fine roots; common fine and medium pores; thin, continuous, brown (7.5YR 5/2) clay films on ped faces and in pores; neutral; abrupt, smooth boundary. Horizon is 16 to 24 inches thick.

Cg—36 to 42 inches +, dark reddish-gray to reddish-gray (5YR 4/2–5/2) silty clay; weak, medium, platy structure; firm when moist, sticky and plastic when wet; few roots; calcareous.

Texture of the plow layer ranges from heavy silt loam to silty clay loam. Areas that have never been plowed have A1 and A2 horizons in place of the Ap horizon. In places a thin A2 horizon occurs beneath the plow layer. Texture of the underlying horizons ranges from silty clay to clay; the content of clay ranges from 40 to 60 percent. The plow layer has a hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 1 or 2. Subsurface horizons have a hue of 5YR or 7.5YR, values of 4, 5, and 6, and chromas of 3 and 4. Mottling generally occurs just below the plow layer and is stronger in the A2 horizon, where present, and in the upper part of the B horizon.

Structure of the surface layer ranges from moderate and strong, very fine and medium, granular to strong, very fine and fine, angular blocky. If an A2 horizon occurs, it has platy structure. The B horizon has moderate and strong, medium and coarse, prismatic structure that breaks to angular blocky structure. The C horizon has mostly weak, coarse, prismatic structure in the upper part and weak and moderate, medium and thick, platy structure in the lower part.

Consistence ranges from friable when moist and slightly sticky and slightly plastic when wet in the surface horizon to firm when moist and plastic and sticky when wet in the lower horizons.

Reaction of the solum ranges from strongly acid to neutral, but reaction of the B horizon is medium acid to neutral. The parent material is calcareous. Depth to carbonates ranges from 36 to 48 inches.

OQUAGA SERIES

The Oquaga series consists of well-drained, moderately deep soils. These soils developed in a thin mantle of Wisconsin glacial till that was dominated by red sandstone and siltstone.

Oquaga soils do not have a drainage associate in Schoharie County. Their analogs on gray or olive-colored material are Lordstown soils. Oquaga soils are similar to Cattaraugus soils but are not so deep to bedrock and do not have a fragipan. They are also similar to Arnot soils, but Arnot soils are less than 20 inches to bedrock.

Oquaga soils are gently sloping to steep and occur on the Allegheny Plateau in the southern part of the county. The native vegetation is forest consisting mainly of sugar maple, beech, oak, ash, and hemlock.

Typical profile of an Oquaga stony silt loam on a slope of 10 percent (in a road cut):

Ap—0 to 5 inches, reddish-brown (5YR 5/3) stony silt loam; strong, fine and medium, granular structure; friable when moist; abundant medium and fine roots; strongly acid; clear, wavy boundary. Horizon is 5 to 8 inches thick.

B21—5 to 16 inches, reddish-brown (5YR 4/3) stony silt loam; very weak, very fine, granular structure; very friable when moist; many medium and few large roots; many fine fragments and pebbles; medium acid; clear, wavy boundary. Horizon is 9 to 15 inches thick.

B22—16 to 24 inches, dark reddish-brown (5YR 3/4) very channery silt loam; very weak, very fine, granular structure; friable when moist; few fine roots; many channery fragments and flagstones; the soil material consists mostly of fillings between the channery fragments and flagstones; medium acid; abrupt boundary. Horizon is 6 to 20 inches thick.

R—24 inches +, red sandstone bedrock.

Colors of the solum have hues ranging from 2.5YR to 7.5YR, values ranging from 3 to 5, and chromas ranging from 4 to 6. In some places very faint mottling occurs in the horizon just above the bedrock. Reaction ranges from pH 5.0 to pH 6.0. This range is higher than is normal for the series. Depth to bedrock ranges from 20 to 40 inches. Outcrops of bedrock are common in most areas.

PAPAKATING SERIES

The Papakating series consists of very poorly drained, medium-textured and moderately fine textured soils. These soils developed on relatively young sediments mainly from soils that formed in material dominated by strongly acid to slightly acid shale and sandstone.

Papakating soils are in the same drainage sequence as the well drained Tioga soils, the moderately well drained Middlebury soils, and the poorly drained Holly soils, all of which occur on gray alluvium. Papakating soils are also in the Barbour-Basher-Holly-Papakating drainage sequence, which is on red alluvium. Papakating soils are differentiated from the better drained Holly soils by lower chromas and prominent instead of distinct mottling in the solum.

Papakating soils commonly occupy basins, abandoned meanders, and slack water areas of flood plains. They occur mainly in the major valleys in the southern part of the county. The native vegetation consists of water-tolerant plants, such as reeds, sedges, cattails, willow, alder, and hemlock. Elm and red maple occur in some places.

Typical profile of a Papakating silt loam on a slope of 2 percent (in an idle field):

A1—0 to 11 inches, very dark brown (10YR 2/2) silt loam that has a high content of organic matter; strong, very fine and fine, granular structure; friable when moist, slightly sticky and slightly plastic when wet; many fine roots; some rotted fragments of wood; common earthworm channels; strongly acid; abrupt, smooth boundary. Horizon is 10 to 18 inches thick.

IIC1g—11 to 25 inches, gray (N 5/0) light silty clay loam that has common, fine, prominent mottles of strong brown (7.5YR 5/6); massive to weak, very coarse, prismatic structure; firm when moist, slightly sticky and plastic when wet; common fine roots; many, fine and medium, random tubular pores; medium acid; abrupt, smooth boundary. Horizon is 10 to 20 inches thick.

IIC2g—25 to 34 inches, dark-gray (N 4/0) light silty clay loam that has common, fine, prominent mottles of dark brown (7.5YR 4/4) along old root channels; massive; firm when moist, slightly sticky and plastic when wet; common fine roots; common, fine and medium, random tubular pores; very thin patchy silt or clay films in pores; medium acid; abrupt, smooth boundary. Horizon is 8 to 20 inches thick.

IIIC3g—34 to 48 inches, layers of dark-gray (N 4/0) silt 3 inches thick interbedded with layers of dark-brown (7.5YR 3/2) woody peat 2 inches thick and layers of dark-gray (N 4/0) sand ½ inch thick; silt is massive, sand is single grain, and peat breaks into clods; silt layers are firm when moist and slightly sticky and plastic when wet; peat is friable when moist and nonsticky and nonplastic when wet; sand is loose when moist and nonsticky and nonplastic when wet; common fine roots; medium acid.

Texture of the surface layer ranges from silt loam to mucky silt loam and silty clay loam. Underlying layers range from fine sand to silty clay loam. The weighted average of the underlying layers is more than 18 percent clay but less than 35 percent clay, and less than 15 percent sand coarser than very fine sand.

Color ranges from very dark brown (10YR 2/2) to black (10YR 2/1) in the surface layer. Below the surface layer, color has hues of 7.5YR to 5Y including neutral colors, values of 4 to 6, and chromas of 0 and 1. In some places there are contrasting layers of gravel that have chromas of 6 to 8. Mottles are confined mainly to root channels and old earthworm channels. Where Papakating soils intergrade toward Holly soils, the chroma is 1 and the surface layer less mucky.

In places coarse gravel or till is at a depth of 25 inches, but in most places these soils are deeper than 36 inches to gravel or till. Reaction ranges from strongly acid to slightly acid but is at least medium acid in some horizons.

PHELPS SERIES

The Phelps series consists of moderately well drained soils that developed in calcareous glacial outwash. This outwash was dominated by limestone, siltstone, and shale material.

Phelps soils are in the same drainage sequence as the well-drained Howard soils, the somewhat poorly drained Fredon soils, and the poorly drained and very poorly drained Halsey soils. They are somewhat similar to the Chenango soils but have a higher content of lime, have more clay in the B horizon, and are wetter.

Phelps soils are nearly level and gently sloping; they occur on outwash plains, deltas, and high alluvial terraces. These soils are mainly in the northern part of the county. The native vegetation is forest consisting mainly of sugar maple, basswood, red maple, ash, and hickory. Some white pine grows locally.

Typical profile of a Phelps gravelly silt loam on a slope of 3 percent (in cropland):

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) gravelly silt loam; strong, fine and medium, granular structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many fine pores; neutral; abrupt, smooth boundary. Horizon is 5 to 9 inches thick.

A2—8 to 15 inches, light olive-brown (2.5Y 5/4) gravelly loam; weak, thin and medium, platy structure; friable when moist, nonsticky and slightly plastic when wet; plentiful fine and medium roots; many, fine and medium pores; neutral; abrupt, wavy boundary. Horizon is 6 to 8 inches thick.

B2t—15 to 20 inches, olive-brown (2.5Y 4/4) gravelly loam that has thin, discontinuous, grayish-brown (2.5Y 5/2) clay films in pores; moderate to weak, fine, subangular blocky structure; peds coated with patchy silt coatings of light olive brown (2.5Y 5/4); firm to friable when moist, nonsticky and slightly plastic when wet; plentiful medium roots; many fine and medium pores; neutral; abrupt, broken boundary. Horizon is 0 to 5 inches thick.

B3t—20 to 25 inches, olive-brown (2.5Y 4/3) gravelly loam with thin discontinuous clay films in pores; common, medium, distinct mottles of yellowish brown (10YR 5/6) and few, fine, faint mottles of grayish brown (2.5Y 5/2); massive; very firm to friable when moist, nonsticky and slightly plastic when wet; few medium roots; common fine and medium pores; violent effervescence with cold dilute hydrochloric acid; abrupt, wavy boundary. Horizon is 5 to 10 inches thick.

IIC—25 to 31 inches +, olive-brown (2.5Y 4/3) very gravelly loamy sand with very thin, patchy, grayish-brown (2.5Y 5/2) clay films in pores; common, medium, faint mottles of olive brown (2.5Y 4/4); massive; friable when moist, nonsticky and nonplastic when wet; no roots; few medium pores; common fine pores; violent effervescence with cold dilute hydrochloric acid.

Color of the surface layer ranges from very dark grayish brown (10YR 3/2) to dark yellowish brown (10YR 4/4) and includes dark grayish brown (10YR 4/2). Texture ranges from gravelly silt loam to loam. Underlying the surface layer is an unmottled or faintly mottled A2 horizon that has hues of 10YR and 2.5Y, values of 3 to 6, and chromas of 2.5 to 4. It ranges from gravelly loam to sandy loam.

The B2t horizon has hues of 2.5Y and 10YR, values of 4 and 5, and chromas of 3 and 4. It ranges from gravelly sandy loam to gravelly clay loam. Structure is generally weak, fine or very fine, subangular blocky, but in the finer textured areas it is moderate in some places. In many places the A2 horizon is mottled in the lower part. The texture of the horizons varies according to the kind of strata in which the horizons formed. Depth to mottling ranges from 12 to 24 inches. Reaction of the B horizon ranges from pH 6.1 to pH 6.7. These soils are calcareous at a depth of 20 to 30 inches.

RED HOOK SERIES

The Red Hook series consists of somewhat poorly drained soils. These soils developed in gravelly glaciofluvial sediments or similar deposits that contain large amounts of shale, siltstone, and sandstone.

The Red Hook soils are in the same drainage sequence as the well-drained Chenango soils. They are similar to the Fredon soils but are more acid and are not calcareous within 3 to 4 feet of the surface.

Red Hook soils are nearly level to gently sloping and occur on outwash plains, deltas, and high alluvial terraces throughout the county. The native vegetation consists of elm, black ash, sugar maple, hemlock, and red maple.

Typical profile of a Red Hook gravelly silt loam on a slope of 2 percent (in a hayfield):

Ap—0 to 9 inches, very dark grayish-brown (2.5Y 3/2) gravelly silt loam; weak, fine, granular structure; friable when moist; abundant medium and fine roots; slightly acid; clear, smooth boundary. Horizon is 6 to 10 inches thick.

A2g—9 to 15 inches, grayish-brown (2.5Y 5/2) gravelly silt loam that has many, distinct mottles of strong brown (7.5YR 5/6); weak, thick, platy structure; firm when moist; few fine roots; medium acid; clear, wavy boundary. Horizon is 5 to 8 inches thick.

B21—15 to 17 inches, olive-brown (2.5Y 4/4) gravelly silt loam streaked with gray (5Y 5/1); many, medium, distinct mottles of strong brown (7.5YR 5/6); weak, thick, platy structure that breaks to weak, fine blocky structure; firm when moist; medium acid; abrupt, wavy boundary. Horizon is 2 to 3 inches thick.

B22g—17 to 30 inches, brown to dark-brown (10YR 4/3) gravelly silt loam that has grayish-brown (10YR 5/2) silt coatings on ped faces and common, medium, distinct mottles of strong brown (7.5YR 5/6); moderate, thick, platy structure; very firm in place when moist; medium acid, clear, wavy boundary. Horizon is 10 to 14 inches thick.

IICg—30 inches +, dark-gray to olive-gray (5Y 4/1–4/2), stratified gravel, sand, and silt; structureless; firm when moist; medium acid.

The surface layer is gravelly loam or silt loam in most places. The A2g horizon is commonly one step lower in chroma than the horizon below it.

The B horizon is gravelly silt loam in most places, but in some places it is fine sandy loam or loam. Its content of clay ranges from 8 to 18 percent. The matrix color of the B horizon has hues of 7.5YR, 10YR, or 2.5Y, values of 4 to 6, and chromas of 2 to 4. The solum is strongly acid to medium acid. This range is higher than is normal for the series. Depth to carbonates is more than 48 inches.

RHINEBECK SERIES

The Rhinebeck series consists of somewhat poorly drained soils that developed in calcareous lacustrine deposits. These deposits consist of stratified and varved clays that have thin lenses of silt and fine sand.

Rhinebeck soils are in the same drainage sequence as the well drained and moderately well drained Hudson soils and the poorly drained and very poorly drained Madalin soils. They have grayer B and C horizons than the similar Odessa soils, which developed in red lacustrine silt and clay.

Rhinebeck soils occur on glacial lake plains and are level or nearly level. The native vegetation consists of white oak, red oak, hickory, sugar maple, beech, and other water-tolerant trees.

Typical profile of a Rhinebeck silt loam on a slope of 5 percent (in a pasture):

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, subangular blocky structure and moderate, medium, granular structure; friable when moist, slightly sticky and plastic when wet; abundant fine roots; many fine pores; strongly acid; abrupt, smooth boundary. Horizon is 6 to 9 inches thick.

B21tg—7 to 14 inches, silty clay loam that has grayish-brown (2.5Y 5/2) ped faces and dark-brown to brown (10YR 4/3) interiors with many, medium, prominent mottles of strong brown (7.5YR 5/6); moderate, medium, prismatic structure that breaks to strong, coarse, angular blocky structure; very firm when moist, very sticky

and very plastic when wet; plentiful fine roots; common fine pores; medium acid; clear, wavy boundary. Horizon is 3 to 7 inches thick.

B22tg—14 to 29 inches, dark grayish-brown (2.5Y 4/2) silty clay that has many, medium, prominent mottles of strong brown (7.5YR 5/6); strong, medium, prismatic structure that breaks to moderate, coarse, angular blocky structure; few dark-gray (10YR 4/1) clay films on ped faces; very firm when moist, very sticky and very plastic when wet; few fine roots; few fine pores; medium acid; gradual, wavy boundary. Horizon is 12 to 17 inches thick.

B3g—29 to 47 inches, dark grayish-brown (10YR 4/2) silty clay loam that has many, fine, prominent mottles of strong brown (7.5YR 5/6); medium, continuous, gray (N 5/0) coats on vertical faces of peds and in pores; weak, medium, prismatic structure; firm when moist, sticky and very plastic when wet; few fine roots; common, very fine and fine pores; neutral; weakly calcareous in lower part; clear, wavy boundary. Horizon is 15 to 20 inches thick.

Cg—47 to 51 inches +, dark-gray (10YR 4/1) silty clay loam that has many, fine, prominent mottles of strong brown (7.5YR 5/6); weak, medium, platy structure; firm when moist, sticky and plastic when wet; no roots; common fine pores; weakly calcareous.

The surface layer ranges from very dark gray (10YR 3/1) to dark grayish brown (10YR 4/2). Its structure is strong to moderate, very fine to medium, granular in the upper part and moderate to weak, very fine to fine, subangular blocky in the lower part. In the wetter areas, Rhinebeck soils have a pale-brown (10YR 6/3) to light brownish-gray (2.5Y 6/2), mottled A2 horizon.

The B horizon has a hue of 10YR or 2.5Y, a value of 4 or 5, and a chroma of 2 or 3. It has many to common, fine and medium, distinct and prominent mottles than have a hue of 7.5YR or 10YR, a value of 4 or 5, and a chroma of 4, 5, or 6.

The C horizon ranges from silty clay loam to clay. It is firm to very firm when moist and is sticky and plastic to very plastic when wet. Reaction of the solum ranges from pH 5.4 to pH 7.0. Depth to calcareous material ranges from 30 to 48 inches. Depth to bedrock is more than 40 inches.

SCHOHARIE SERIES

The Schoharie series consists of well drained and moderately well drained soils. These soils developed in calcareous, reddish, glaciolacustrine silt and clay.

The Schoharie soils are in the same drainage sequence as the somewhat poorly drained Odessa soils and the poorly drained and very poorly drained Lakemont soils. They are differentiated from the Odessa soils by depth to mottling, which is more than 16 inches in the Schoharie soils and is 10 inches or less in the Odessa soils. Schoharie soils have a redder colored solum and substratum than the Hudson soils.

Schoharie soils are undulating to hilly and occur in dissected lake plains in the southern and eastern parts of the county. The native vegetation is forest consisting mainly of sugar maple, red oak, hickory, and basswood.

Typical profile of a Schoharie silt loam on a slope of 5 percent (in an alfalfa field):

Ap—0 to 7 inches, brown to dark-brown (7.5YR 4/2) silt loam; weak, fine, subangular blocky structure and moderate, fine, granular structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many fine pores; neutral; abrupt, smooth boundary. Horizon is 5 to 8 inches thick.

A2—7 to 10 inches, brown (7.5YR 5/3) silt loam; weak, medium, platy structure that breaks to moderate, fine, subangular blocky structure; firm when moist, sticky and plastic when wet; abundant fine roots; many fine pores; neutral; clear, wavy boundary. Horizon is 2 to 4 inches thick.

B21t&A—10 to 16 inches, light reddish-brown (5YR 6/3) silty clay loam that has many, medium, faint mottles of reddish brown (5YR 5/4); thin, patchy, brown (7.5YR 5/3) films of silt on ped faces in upper part; weak, medium, prismatic structure that breaks to moderate and strong, fine, subangular blocky structure; firm when moist, very sticky and very plastic when wet; many fine roots; common fine pores; neutral; clear, wavy boundary. Horizon is 5 to 15 inches thick.

B22t—16 to 36 inches, reddish-brown (5YR 4/4) silty clay that has common, fine, faint mottles of brown or dark brown (7.5YR 4/4); thin, continuous, reddish-brown clay films on ped faces and in pores; moderate to strong, medium, prismatic structure that breaks to strong, medium and coarse, angular blocky structure; very firm when moist, very sticky and very plastic when wet; many fine roots; common fine pores; neutral; gradual, wavy boundary. Horizon is 14 to 20 inches thick.

B23t—36 to 44 inches, reddish-brown (5YR 4/4) silty clay that has thin, continuous, reddish-brown (5YR 5/3) clay films on faces of peds and in pores; weak, medium, prismatic structure that breaks to moderate and strong, coarse, angular blocky structure; very firm when moist, very sticky and very plastic when wet; few fine roots; common fine pores; neutral; clear, wavy boundary. Horizon is 8 to 12 inches thick.

C—44 to 54 inches +, reddish-brown (5YR 4/4) silty clay that has very thin patchy films on faces of peds and in pores; weak to moderate, coarse, angular blocky structure; faint evidence of varves; very firm when moist, very sticky and very plastic when wet; very few fine roots; few fine pores; common, medium, distinct spots of pink (7.5YR 7/4) lime; calcareous.

The surface layer generally has a hue of 7.5YR, but in places the hue is 10YR; its values are 4 to 6, and its chromas are 2 to 4.

The Bt horizon has a hue of 7.5YR or 5YR, a value of 4 or 5, and a chroma of 3 or 4. This horizon is silty clay loam or silty clay. The content of clay generally is between 35 and 60 percent. Consistence is firm to very firm when the soils are moist, and it is sticky and plastic to very sticky and plastic when the soils are wet. Structure of the Bt horizon is commonly moderate, medium, prismatic, but it ranges from weak to strong and from medium to coarse. Reaction of the solum ranges from pH 5.5 to pH 7.3. Depth to calcareous material ranges from 36 to 50 inches. In some places the substratum of these soils is varved.

SCIO SERIES

The Scio series consists of moderately well drained soils that formed in silty deposits of alluvial, lacustrine, or eolian origin. These soils are not extensive in Schoharie County.

The Scio soils occur closely with the wetter Fredon, Halsey, and Madalin soils. They also occur with the Mohawk and Appleton soils, which are on adjacent hills.

Scio soils are mainly in the alluvial and lacustrine sediments near Dorloo. The native vegetation is dominantly hardwoods, including sugar maple, oak, and ash. Also common are hemlock and white pine.

Typical profile of Scio silt loam, 0 to 3 percent slopes (in a hayfield):

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, very fine, granular structure; friable when moist; many fine roots; strongly acid; abrupt, smooth boundary. Horizon is 8 to 10 inches thick.

B21—10 to 14 inches, light olive-brown (2.5Y 5/4) silt loam; weak, fine, subangular blocky structure; friable when moist; abundant fine roots; strongly acid; abrupt, wavy boundary. Horizon is 4 to 12 inches thick.

B22—14 to 20 inches, pale-brown (10YR 6/3) silt loam that has many, medium, distinct mottles of yellowish brown (10YR 5/6 and 5/8); weak, fine, subangular blocky structure; friable when moist; plentiful fine roots;

strongly acid; abrupt, wavy boundary. Horizon is 4 to 8 inches thick.

B3—20 to 27 inches, brown (10YR 5/3) silt loam that has many, medium, distinct mottles of light brownish gray (10YR 6/2), dark yellowish brown (10YR 4/4), and yellowish brown (10YR 5/6); weak, thick, platy structure; friable when moist; strongly acid; few fine roots; clear, wavy boundary. Horizon is 6 to 12 inches thick.

C1–27 to 47 inches, dark grayish-brown (2.5Y 4/2) silt loam that has many, medium, prominent mottles of strong brown (7.5YR 5/8) and light brownish gray (10YR 6/2); weak, thick, platy structure; firm when moist; very few roots; strongly acid; abrupt, wavy boundary. Horizon is 10 to 25 inches thick.

IIC2—47 to 57 inches; grayish-brown (10YR 5/2) very fine sand; single grain; strongly acid.

Texture of the surface layer is mainly silt loam. The B horizon is silt loam and very fine sandy loam in texture. Sand coarser than very fine sand makes up less than 15 percent of the B horizon. The B horizon contains thin lenses of clay in places.

Color of the Ap horizon has a hue of 10YR, a value of 3 or 4, and chromas of 2 to 4. Color of the rest of the solum ranges in hue from 7.5YR to 2.5Y, in value from 4 to 6, and in chroma from 2 to 4. Mottling occurs at a depth of 14 to 20 inches. Reaction ranges from pH 5.4 to pH 6.0 in unlimed areas.

TIOGA SERIES

The Tioga series consists of well-drained, medium acid and strongly acid soils along streams that drain glaciated areas underlain by gray sandstone and shale. In Schoharie County the Tioga soils are shallower to a contrasting sandy and gravelly substratum than are typical Tioga soils in other places.

The Tioga soils are in the same drainage sequence as the moderately well drained Middlebury soils, the somewhat poorly drained and poorly drained Holly soils, and the very poorly drained Papakating soils. The Tioga soils are analogs of the Barbour soils, which developed on red alluvium from soils formed from material dominated by sandstone and shale.

Tioga soils are nearly level and occur on bottom lands throughout the county. The native vegetation consists of red maple, poplar, willow, elm, and beech.

Typical profile of a Tioga loam on a slope of 2 percent (in a hayfield):

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) loam, grayish brown (10YR 5/2) to light brownish gray (10YR 6/2) when dry; moderate, very fine and fine, subangular blocky structure and strong, very fine and fine, granular structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; very fine, fine, and medium pores; earthworm channels; neutral; abrupt, smooth boundary. Horizon is 6 to 12 inches thick.

B2—9 to 18 inches, very dark grayish-brown (10YR 3/2) loam, grayish brown (10YR 5/2) to light brownish gray (10YR 6/2) when dry; moderate, medium, angular blocky structure that breaks to moderate, very fine and fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many, very fine and fine, random tubular pores; a few pebbles; earthworm channels; slightly acid; abrupt, wavy boundary. Horizon is 3 to 18 inches thick.

IIB3—18 to 27 inches, dark grayish-brown (2.5Y 4/2) very gravelly loam; single grain and some moderate, very fine and fine, subangular blocky structure; loose when dry, slightly sticky and slightly plastic when wet; plentiful fine roots; 20 percent of soil mass, by volume, is cobblestones and 40 percent is pebbles and coarse sand; medium acid; abrupt, wavy boundary. Horizon is 9 to 18 inches thick.

IIC—27 to 36 inches +, dark grayish-brown (10YR 4/2) very gravelly medium sand; single grain; loose when dry, nonsticky and nonplastic when wet; common fine roots; many pores between individual grains; 60 percent of soil mass, by volume, is pebbles less than 3 inches in diameter; pebbles have thin to medium sinuous ridges consisting of very fine sand or silt at what appears to be the interface between pebbles and the medium sand; medium acid.

Texture of the surface layer and the B2 horizon is fine sandy loam, silt loam, gravelly loam, or loam. In some places the B2 horizon is very gravelly in the lower part. In many places these soils are underlain by layers of sand and gravel at a depth ranging from 15 to 30 inches.

The color of the surface layer has hues of 7.5YR to 2.5Y, values of 3, 4, and 5, and chromas of 2 and 3. The rest of the solum has hues of 7.5YR to 2.5Y, values of 3, 4, and 5, and chromas of 2 to 4. The underlying sand and gravel has hues of 10YR and 2.5Y, values of 3 and 4, and chromas of 2, 3, and 4.

Structure is mostly moderate, fine, granular in the plow layer, but it is weak to moderate, fine and very fine, subangular blocky in some places. The rest of the solum generally has moderate or weak, fine and medium, blocky structure, and the unconforming gravel and sand is single grain.

Consistence in the solum ranges from loose when the solum is dry to slightly sticky and slightly plastic when it is wet. In the underlying layers of sand and gravel consistence ranges from loose when the layers are dry to nonsticky and nonplastic when they are wet.

Reaction ranges from pH 5.8 to pH 6.8 in the surface layer and from pH 5.6 to pH 6.5 in the lower horizons.

TULLER SERIES

The Tuller series consists of somewhat poorly drained and poorly drained soils that developed in acid glacial till that is underlain by bedrock at a depth of 10 to 20 inches. The till contains channery and flaggy fragments that were derived from the underlying sandstone and shale.

The Tuller soils occur closely with and are similar to the shallow well-drained Arnot soils, the moderately deep well-drained Lordstown and Oquaga soils, and the moderately deep somewhat poorly drained and poorly drained Allis soils. They are similar to the Chippewa and Volusia soils but are less than 20 inches to bedrock and lack a fragipan. They are coarser textured than the Allis soils.

Tuller soils occur on uplands in typically long, narrow, level areas or slight depressions that are bedrock controlled. The native vegetation consists of maple, beech, elm, and hemlock.

Typical profile of a Tuller silt loam on a slope of 2 percent (in an idle field):

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; very friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many very fine pores; 10 percent of soil mass, by volume, is channery fragments; medium acid; abrupt, smooth boundary. Horizon is 4 to 8 inches thick.

A1—6 to 9 inches, dark grayish-brown (10YR 4/2) channery silt loam; weak, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; many fine roots; common fine pores; strongly acid; clear, smooth boundary. Horizon is 0 to 4 inches thick.

B2g—9 to 15 inches, grayish-brown (2.5Y 5/2) channery silt loam that has many, prominent mottles of yellowish brown (10YR 5/6); weak, medium, subangular blocky structure; few fine roots; few fine pores; friable when moist, slightly sticky and slightly plastic when wet; strongly acid; abrupt, smooth boundary. Horizon is 5 to 10 inches thick.

R—15 inches +, sandstone bedrock.

The surface layer has a hue of 10YR or 7.5YR, a value of 3 or 4, and a chroma of 2 or 3. It generally is silt loam but in places is channery silt loam or loam.

The B horizon commonly has a hue of 2.5Y, but in a few places hue is as much as 7.5YR; value is 4 or 5, and chroma is 2 or 3. Depth to mottling ranges from 4 to 10 inches, and mottles are common or many, fine to medium, and prominent. In some places there is a grayish-brown (2.5Y 5/2) to gray (5Y 5/1) A1 horizon 2 to 4 inches thick.

Depth to bedrock ranges from 10 to 20 inches. Reaction in the solum ranges from pH 5.0 to pH 5.8.

TUNKHANNOCK SERIES

The Tunkhannock series consists of well-drained soils that developed in acid, reddish glacial outwash of Wisconsin age. The outwash was dominated by materials from red sandstone and shale, which impart reddish colors to the solum.

The Tunkhannock soils are reddish analogs of the Chenango soils, which developed on gray outwash material.

These soils occur on terraces and their edges and on kames. They are nearly level on the terraces and are steep on the terrace edges and on kames. The native vegetation consists of sugar maple, beech, ash, oak, and some white pine and hemlock.

Typical profile of a Tunkhannock gravelly silt loam on a slope of 8 percent (in an idle field):

Ap—0 to 5 inches, brown to dark-brown (7.5YR 4/2) gravelly silt loam; moderate, fine, granular structure; very friable when moist, nonsticky and slightly plastic when wet; abundant fine roots; many fine pores; medium acid; abrupt, smooth boundary. Horizon is 4 to 8 inches thick.

B21—5 to 9 inches, reddish-brown (5YR 4/4) gravelly silt loam; weak, very fine, subangular blocky structure and weak, fine, granular structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many very fine pores; medium acid; clear, wavy boundary. Horizon is 4 to 5 inches thick.

B22—9 to 21 inches, yellowish-red (5YR 4/6) gravelly silt loam; weak, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; plentiful fine roots; many very fine pores; medium acid; clear, wavy boundary. Horizon is 10 to 18 inches thick.

IIC—21 to 42 inches +, brown (7.5YR 5/2) very gravelly sandy loam; massive; friable to loose when moist, nonsticky and nonplastic when wet; many fine roots; common fine pores; medium acid.

Red and gray materials in varying proportion cause a considerable range in colors in both the solum and the C horizon. Generally, the solum has a hue of 7.5YR or 5YR and the C horizon has a hue of 7.5YR or 10YR. These soils are gravelly in most places, but some areas are free of gravel and some are very cobbly. Texture ranges from fine sandy loam to silt loam. Reaction ranges from pH 5.2 to pH 6.0.

VOLUSIA SERIES

The Volusia series consists of somewhat poorly drained soils that have a strongly expressed fragipan. These soils developed from firm, dark grayish-brown glacial till that was dominated by acid, fine-grained sandstone and shale.

The Volusia soils are in the same drainage sequence as the well drained and moderately well drained Mardin soils and the poorly drained Chippewa soils. They have a more acid fragipan than the Erie soils and are coarser textured than the Allis soils. They developed on similar but deeper parent materials than did Tuller soils. The Volusia soils are analogs of the Morris soils, which developed on acid red materials.

Volusia soils occur on long, uniform to slightly concave slopes of 3 to 14 percent. The native vegetation is forest consisting mainly of red maple, beech, hemlock, ash, white pine, and some oak.

Typical profile of a Volusia channery silt loam on a slope of 4 percent (in an idle field):

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) channery silt loam; moderate, fine, granular structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many fine pores; strongly acid; abrupt, wavy boundary. Horizon is 6 to 8 inches thick.

B2—7 to 11 inches, dark yellowish-brown (10YR 4/4) channery loam that has common, fine, faint mottles of light olive brown (2.5Y 5/4); weak, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; plentiful fine roots; many fine pores; medium acid; abrupt, wavy boundary. Horizon is 2 to 8 inches thick.

A'2g—11 to 15 inches, light olive-gray (5Y 6/2) channery loam that has common, medium, distinct mottles of yellowish brown (10YR 5/4); weak, thin, platy structure; firm when moist, slightly sticky and slightly plastic when wet; plentiful fine roots; common fine pores; strongly acid; abrupt, irregular boundary. Horizon is 2 to 6 inches thick

B'x1g—15 to 22 inches, grayish-brown (2.5Y 5/2) channery loam that has common, medium, distinct mottles of yellowish brown (10YR 5/6); moderate, very coarse, prismatic structure (prisms 12 to 24 inches across) that breaks to weak to moderate, thin, platy structure; discontinuous silt coats and horizontal streaks on plates; surrounding the prisms are silty tongues of material from the A'2g horizon that are 4 inches wide at top and 1 inch wide at a depth of 22 inches; tongues have olive-gray (5Y 5/2) centers and strong-brown (7.5YR 5/8) borders one-eighth inch thick; very firm and brittle when moist, slightly sticky and slightly plastic when wet; no roots; common fine pores; strongly acid; diffuse, wavy boundary. Horizon is 4 to 10 inches thick.

B'x2—22 to 46 inches, dark grayish-brown to olive-brown (2.5Y 4/3) channery loam that has many, fine and medium, prominent mottles of strong brown (7.5YR 5/6); prisms like the ones in horizon above at top of this horizon, but they become thinner and then disappear as depth increases; extremely firm and brittle when moist, nonsticky and slightly plastic when wet; no roots; 30 to 50 percent of soil mass, by volume, is channery fragments and flagstones; some black (5YR 2/1) stains of manganese; strongly acid; diffuse, wavy boundary. Horizon is 20 to 40 inches thick.

C'x—46 to 48 inches, dark grayish-brown (2.5Y 4/2) channery loam; massive but breaks to fine and medium angular blocky structure; very firm and brittle when moist, nonsticky and slightly plastic when wet; no roots; 40 percent of soil mass, by volume, is coarse fragments; slightly acid.

Color of the surface layer is generally very dark grayish brown (10YR 3/2), but in places it is dark grayish brown (2.5Y 4/2). The B horizon has a hue of 10YR, values of 4 and 5, and chromas of 2 to 4. The A'2 horizon has hues of 2.5Y and 5Y, values of 4 to 6, and chromas of 2 to 4.

Texture of the solum ranges from silt loam to loam. Where the material contains large amounts of silt, the prisms in the B'x horizon are smaller than those described and rock fragments are coated with silt on their upper surfaces. In forested areas that have micromounds and microdepressions, the B horizon occurs in the mounds but not in the depressions. In the depressions the surface layer rests on the A'2 horizon.

Depth to the fragipan ranges from 10 to 18 inches in plowed areas. Reaction of the fragipan ranges from pH 5.0 to pH 6.0. Volusia soils are generally very stony in their natural state.

WAYLAND SERIES

The Wayland series consists of poorly drained soils that developed in medium-textured, slightly acid to calcareous sediments that were recently deposited by streams.

These soils occur with the well drained Tioga soils and the moderately well drained Middlebury soils. They are analogs of Holly soils, which also developed on recently deposited sediments, but these sediments are more acid than those of the Wayland soils.

Wayland soils are nearly level to depressional. They are shallower to a substratum that has more coarse fragments than is normal for the series. They occur on bottom lands of rivers and smaller streams in the northern part of the county. The native vegetation is forest consisting of red maple, elm, and other water-tolerant trees.

Typical profile of Wayland silt loam on a slope of 2 percent (in a hayfield):

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; many fine pores; neutral; abrupt, wavy boundary. Horizon is 4 to 10 inches thick.

B2g—9 to 15 inches, dark grayish-brown (2.5Y 4/2) silt loam that has many, medium, prominent mottles of yellowish red (5YR 4/6); weak, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; abundant fine roots; common fine pores; neutral; abrupt, wavy boundary. Horizon is 6 to 20 inches thick.

C1g—15 to 22 inches, dark-gray (N 4/0) loam that has common, medium, prominent mottles of brown to dark brown (7.5YR 4/4); massive; friable when moist, slightly sticky and slightly plastic when wet; plentiful fine roots; common fine pores; neutral; abrupt, wavy boundary. Horizon is 5 to 20 inches thick.

IIC2g—22 to 30 inches, gray (10YR 5/1) gravelly loam that has common, medium, prominent mottles of yellowish brown (10YR 5/8); single grain; friable when moist, slightly sticky and nonplastic when wet; no roots; neutral; abrupt, wavy boundary. Horizon is 8 to 18 inches thick.

Color of the surface layer is very dark gray (10YR 3/1) or very dark grayish brown (10YR 3/2). Mottling generally occurs in the root channels. The underlying strata range from dark gray (N 4/0) to colors that have hues of 5Y, 2.5Y, and 10YR, values of 4, 5, and 6, and chromas of 1 and 2. Depth to distinct and prominent mottles is 8 to 10 inches. Mottles are common to many and fine to medium. They have hues of 5YR, 7.5YR, and 10YR, values of 4, 5, and 6, and chromas of 4 to 8.

Texture of the solum is mostly silt loam but ranges from loam to silty clay loam and in places is gravelly. Where the solum is loam or is gravelly, the soils are outside the range of the Wayland series and are taxadjuncts. Depth to the gravelly substratum is generally more than 20 inches.

Structure of the solum ranges from weak and moderate, very fine and medium, granular to weak and moderate, very fine and fine, subangular blocky. In the gravelly strata the material is single grain. Consistence is friable to firm when the material is moist and is slightly sticky and nonplastic to plastic when it is wet. Reaction ranges from pH 6.8 to pH 7.0.

General Nature of the County

This section provides general information about Schoharie County. It discusses settlement and population, agriculture, vegetation, climate, and other subjects of general interest.

Settlement and Population

German immigrants made the first permanent white settlement in Schoharie County in 1713 when they settled in the rich lowlands of Schoharie Valley near the site of Middleburg. They were soon followed by immigrants from the New England Colonies. A little later the English settled on the present southern boundary of the county not far from Stamford in Delaware County. Other settlements were made along the major streams of Schoharie County. Rapid settlement continued after the early wars, and population increased until about 1880.

The population of Schoharie County was 32,910 in 1880; 23,835 in 1910; 20,812 in 1940; and 22,616 in 1960. The county remains one of the most rural in the State, but the recent trend is for a decrease in rural population and an increase in nonrural population. In 1960, about 23 percent of the employed people in the county worked at farming and forestry. About 8 percent were employed in construction and mining, 16 percent in manufacturing, 15 percent in wholesale and retail trade, and the rest in transportation, public utilities, public administration, real estate, and the like.

Agriculture and Land Use

The early settlers of the county cleared small patches of soils in valleys and planted them to wheat and corn. Grain was the main crop until it became more profitable to grow grain in the western part of the United States. As the importance of grain decreased, dairy farms increased in the county, and today dairying is the main agricultural enterprise. In 1964, dairy farmers sold 195,065,681 pounds of milk and 35,250 pounds of butterfat. Milk was sold from 697 farms and eggs from 25 poultry farms.

According to the 1964 Census of Agriculture, important kinds of livestock in the county were as follows:

	Number
Milk cows	21,418
Heifers and heifer calves	11,092
Hogs and pigs	625
Sheep and lambs	1,064
Chickens (4 months and older)	188,495

The importance of dairying in the county is reflected by the kinds of crops grown. In 1964 the principal crops and their acreages were as follows:

	Acres
Alfalfa and alfalfa mixture	29,087
Clover, timothy, and mixtures of clover and grasses	25,474
Small grain for hay	993
Corn for silage	6,527
Corn for grain	995
Wheat	647
Oats	5,310
Vegetables for sale	954
Tree fruits	374

Truck crops are grown for the baby food industry on some of the large farms in the valleys, especially Schoharie Valley. These vegetables are sold mainly to the food-processing plant in Canajoharie. Corn and other grain are grown as cash crops on several farms.

Approximately 56 percent of the 400,000 acres in Schoharie County is in farms. In 1964, cropland totaled 103,377 acres, of which 13,719 was pastured. Pasture totaled 81,003 acres and was made up of the cropland pastured, 14,280 acres of woodland pasture, and 53,004 acres of other pasture (noncrop, open, or brush pasture).

The long term trend has been a general decrease in the number of farms and an increase in the size of farms. The average size of a farm in 1964 was 214 acres, as compared

to 195 acres in 1959. Farms decreased in number from 1,118 in 1959 to 1,044 in 1964. Of the 1,044 farm operators, 647 were full owners, 360 were part owners, 2 were managers, and 35 were tenants.

Industry, Transportation, and Markets

Schoharie County is essentially agricultural, though many of its residents work in industries in Albany, Schenectady, and other cities nearby. Some of the residents are employed in industries in the county. A garment factory in Cobleskill employs about 100 people, mostly women. The four quarries in the county produce different kinds of products—cement, agricultural lime, stone for roads, and stone for other purposes.

The main roads in the county are U.S. Highway No. 20 and State Routes 7 and 145. U.S. Highway No. 20 crosses the extreme northern part of the county in an east-west direction. State Route 7 enters the county at its northeastern boundary and passes through Central Bridge, Cobleskill, and Richmondville. State Route 145 enters at the southeastern boundary and runs northwesterly as it passes through Middleburg, Cobleskill, and Sharon. The Delaware and Hudson Railroad runs southwesterly through the county, but it has a freight station only at Cobleskill and no passenger service at all. The Greyhound Bus Line supplies the only passenger service in the county. Its buses run once daily in each direction along U.S. Highway No. 20 and State Route 7. Three truck lines serve the county. At Cobleskill a flying club has an airfield that accommodates twin-engine executive aircraft and other small planes.

Schoharie County is close to the Port of Albany and about 135 miles from New York City. Durable goods can be transported via the Port of Albany to markets throughout the world. New York City and the closer population centers of Albany, Schenectady, and Troy are markets for fruits, vegetables, dairy and poultry products, and other perishable goods. Some vegetables grown in the county are sold to a processing company that makes baby food.

Vegetation

The native vegetation of Schoharie County consisted of hardwood forest. Southern hardwood trees, mainly ash, chestnut, oak, hickory, and poplar, were dominant on the low plateau, but they were intermingled with species of northeastern hardwoods. Dominant on the high plateau were white pine, hemlock, and northern hardwoods, mainly sugar maple, beech, and birch.

The virgin forest consisted of vigorous, healthy trees, and there was little undergrowth. These forests were gradually cleared, however, as settlement and farming increased.

Widespread throughout the county are aspen, juneberry, a wild species of cherry locally called red cherry, dogwood, beech, striped maple, and several kinds of birch. Alder, soft maple, elm, willow, and red-ozier grow in areas where drainage is impeded. Marsh spots have sphagnum moss and ferns. Wintergreen is common in wooded areas, and blackberry and raspberry grow in old fields. Growing on idle land are thornapple, sumac, sweetfern, cinquefoil, hardhack, devils-paintbrush, wild thyme, wild carrot, mullein, black-eyed-susan, oxeye-daisy, thistles, goldenrod, and many other plants.

In the southern part of the county, large areas have been reforested by the State. Between 1909 and 1952, approximately 20,000 acres were reforested by the New York State Conservation Department. Most areas were planted to red pine. In other parts of the high plateau, farming was abondoned and the fields allowed to revert to native forest. About half of Schoharie County is in forest.

Climate of Schoharie County [9]

Schoharie County has a humid-continental climate. Summers are warm, and the long, cold winters have frequent periods of stormy weather. Precipitation is least in winter and greatest late in spring and in summer. Air from the Atlantic Ocean occasionally reaches the county and produces considerable cloudiness, high humidity, and moderate temperatures.

The weather varies in Schoharie County because the county is in or near the paths of most major weather systems that move across the continent. Temperatures and other atmospheric conditions usually change from day to day and from week to week. Seasonal weather varies from year to year. At times, however, there are only minor changes in the weather for several days or a week. Periods of fairly high temperature in summer or near zero temperature in winter may last for a week or longer. Cloudiness or overcast skies are common in winter.

Variations in topography greatly affect the climate of Schoharie County. The general climate is influenced and modified by differences in elevation and in slope. The climate is not directly influenced by the Great Lakes, because the county is too far from them. Also, the moderating effect of the Atlantic Ocean is lessened by mountains to the south and east. Table 10 is a summary of climate data from records at Middleburg.

Temperature

In Schoharie County the temperature changes during the day and from day to day, but neither the daily range in temperature nor the change from day to day is as great as in the central part of the United States. Sharp falls in temperature within several hours are not common, but in winter and early in spring, temperatures sometimes fall 25 to 40 degrees within 24 hours. Warming trends are usually less abrupt.

The data on temperature given in table 10, though recorded at Fultonham, 4 miles southwest of Middleburg, applies to other valley areas of the county that have an elevation between 700 and 1,000 feet. As elevation increases, the temperature tends to be cooler. This is shown in table 11, which compares temperature at three places that vary considerably in elevation.

Air drainage, in a valley or on a sloping hillside, also affects temperature in Schoharie County. In valleys that are well shielded from the wind, and in which air tends to stagnate, the temperature is higher during daytime than it is in places where air moves freely. But a valley with poor air drainage cools more during hours of darkness than do areas where air moves freely.

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[9] By A. BOYD PACK, State climatologist, U.S. Weather Bureau, Ithaca, New York.

TABLE 10.—*Temperature and precipitation at Middleburg* [1]

[Elevation, 770 feet]

Month	Temperature				Average heating-degree days [2]	Precipitation						
	Average daily maximum	Average daily minimum	7 years in 10 will have—			Average total	Record minimum	3 years in 10 will have—		Average number of days with 0.10 inch or more—	Snow	
			Maximum equal to or higher than—	Minimum equal to or lower than—				More than—	Less than—		Average total	7 years in 10 will have more than—
	° F.	° F.	° F.	° F.		Inches	Inches	Inches	Inches		Inches	Inches
January	33	12	50	−4	1,315	2.4	0.7	3.2	1.9	7	14	8
February	35	13	52	−3	1,160	2.4	.5	3.1	1.7	6	15	10
March	44	22	65	8	1,000	2.7	.9	3.1	1.9	9	11	7
April	57	34	77	23	580	3.1	1.6	3.7	2.6	9	3	(3)
May	69	43	84	30	280	3.8	1.3	4.8	2.4	9	-------	(4)
June	79	52	92	39	85	3.4	1.6	3.8	2.4	8	-------	---------
July	83	57	92	46	20	3.3	1.1	3.7	3.2	7	-------	---------
August	81	55	92	43	40	2.9	.7	3.1	2.3	6	-------	---------
September	75	47	90	33	185	3.2	.2	3.9	2.3	7	-------	---------
October	64	38	80	24	440	3.2	1.2	3.9	2.4	7	(3)	(4)
November	49	29	65	15	785	2.9	.8	3.9	2.0	7	4	2
December	36	16	50	−2	1,190	2.6	.6	3.2	2.1	7	10	7
Year	59	35	94	−10	7,080	35.9	29.2	38.7	33.6	89	57	48

[1] Period of record 1942–62.
[2] Based on 65° F. daily mean temperature.
[3] Trace.
[4] In 1 year in 10, there will be more than a trace.

TABLE 11.—*Average monthly maximum and minimum temperatures at Sharon Springs, Cobleskill, and Middleburg*

Month	Average maximum temperature			Average minimum temperature		
	Sharon Springs [1] (1,360 ft.)	Cobleskill [2] (940 ft.)	Middleburg [3] (770 ft.)	Sharon Springs [1] (1,360 ft.)	Cobleskill [2] (940 ft.)	Middleburg [3] (770 ft.)
	°F.	°F.	°F.	°F.	°F.	°F.
January	30	32	33	13	13	12
February	31	33	35	13	14	13
March	41	42	44	22	22	22
April	54	56	57	33	35	34
May	65	68	69	44	44	43
June	76	78	79	53	53	52
July	80	82	83	58	58	57
August	78	80	81	56	56	55
September	71	73	75	49	49	47
October	59	63	64	39	39	38
November	45	48	49	29	30	29
December	32	35	36	17	18	16

[1] Period of record 1938–52.
[2] Period of record 1946–62.
[3] Period of record 1942–62.

Slopes facing south and west have higher average daily and monthly temperatures than do similar slopes facing north and east. At the Middleburg station the temperature observations are taken near the base of a gentle slope that faces southwest. Air drainage at this site seems to be moderately restricted.

Temperatures of 90° F. or higher generally occur on 10 to 15 days per year in valleys having an elevation of about 700 to 1,000 feet. The number of days, however, ranges from less than 7 in rather cool summers to more than 25 in abnormally warm summers. Such temperatures occur almost entirely in June, July, and August, though in 2 out of 3 years, 90° temperatures have been recorded in September at an elevation of 700 to 1,000 feet. Rarely does the temperature rise to 90° in May. Temperatures of 100° or higher have been recorded in Schoharie County, but not more than two or three times in the past 20 years.

During most winters, temperatures of zero or colder generally occur on 12 to 18 days at an elevation of 700 to 1,000 feet, but the range is from less than 8 days in notably mild winters to 25 days or more in especially cold winters. The daytime temperature generally does not exceed 32° for 40 to 50 days during the period from late in November through March. Temperatures of zero or colder may be expected from early in December until the middle of March. In about 5 out of 10 winters, a temperature of 15° below zero occurs at an elevation of 700 to 1,000 feet, but temperatures colder than 20° below zero are quite rare. The frequency of temperatures below zero is greater at the higher elevations and in deep valleys where the air tends to stagnate.

The average last date in spring with a temperature of 32° or colder is about May 15 at an elevation of 700 to 1,000 feet, provided air drainage is fair to good. The first date in fall for this freezing temperature is about September 28. In most years the last date in spring that has a temperature of 32° or colder occurs between May 7 and May 25, and the first date in fall that has such temperature is between September 20 and October 4.

Table 12 shows additional data on freezing and near freezing temperatures, and their probability of occurrence at various times during spring and fall. These data apply

Table 12.—*Probability of last freezing temperatures in spring and first in fall* [1]

[Data apply to areas in county having fair to poor air drainage and elevations 700 to 1,000 feet]

Probability	Dates for given probability and temperature					
	16° F. or lower	20° F. or lower	24° F. or lower	28° F. or lower	32° F. or lower	36° F. or lower
Spring:						
1 year in 10 later than	April 6	April 15	May 2	May 16	May 30	June 10
3 years in 10 later than	March 29	April 7	April 24	May 8	May 22	June 2
5 years in 10 later than	March 22	March 31	April 17	May 1	May 15	May 26
7 years in 10 later than	March 16	March 25	April 11	April 25	May 9	May 20
9 years in 10 later than	March 7	March 16	April 2	April 16	April 30	May 11
Fall:						
1 year in 10 earlier than	November 7	October 26	October 9	September 27	September 13	September 1
3 years in 10 earlier than	November 16	November 4	October 18	October 6	September 22	September 10
5 years in 10 earlier than	November 22	November 10	October 24	October 12	September 28	September 16
7 years in 10 earlier than	November 29	November 16	October 31	October 19	October 5	September 23
9 years in 10 earlier than	December 7	November 25	November 8	October 27	October 13	October 1

[1] The following example illustrates how to use and interpret this table. Take a temperature of 32° F. or lower. In 1 year out of 10 (10 percent probability), a temperature of 32° or below can be expected to occur later than May 30; in 5 years out of 10 (50 percent probability), a temperature of 32° or below can be expected to occur later than May 15. The fall dates are interpreted similarly for a given temperature, but the occurrence is earlier than the given date.

to locations in Schoharie County that have fair to good air drainage and an elevation of 700 to 1,000 feet. Areas in the county with appreciably higher elevations or valleys where cold air tends to stagnate will have later dates in spring and earlier dates in fall than those listed in table 12. The dates in table 12 can be adjusted so that they apply to areas that have an elevation of more than 1,300 feet, and to bowl-shaped areas that have poor air drainage, by adding 7 to 10 days to the date in spring and by subtracting 7 to 10 days to the date in fall.

Published reports (*8, 9*) give additional information on freezing temperature in Schoharie County.

At an elevation of 700 to 1,000 feet, the growing season or freeze-free period, averages about 125 days. The growing season, however, has been known to be as short as 115 days and as long as 155 days in the vicinity of Middleburg, Cobleskill, and comparable locations. Weather records at such locations indicate that in 7 out of 10 years the length of the freeze-free season ranges from approximately 125 to 145 days.

Table 13.—*Monthly precipitation at Cobleskill, Middleburg, and Manorkill*

[Period of record is 1951–62]

Month	Cobleskill (940 ft.)	Middleburg (770 ft.)	Manorkill (1,620 ft.)
	Inches	*Inches*	*Inches*
January	2. 6	2. 6	2. 5
February	2. 8	2. 8	2. 7
March	3. 0	3. 3	3. 2
April	3. 5	3. 3	3. 7
May	2. 8	3. 4	3. 6
June	2. 7	3. 0	3. 5
July	3. 5	3. 1	3. 6
August	3. 0	3. 0	3. 3
September	3. 1	3. 5	4. 0
October	3. 1	3. 6	3. 9
November	2. 7	2. 8	3. 0
December	2. 4	2. 7	2. 7
Year	35. 2	37. 1	39. 7

Precipitation

The average annual precipitation is 39 to 40 inches in the western and southern extremities of the county, but it decreases 34 to 36 inches in the east-central and northeastern parts. In most years the total annual precipitation is within 3 inches of the average.

The total precipitation during the growing season (May through September) ranges from about 16.5 inches in the east-central and northeastern parts of the county to about 18 inches in the western and southern extremities. Table 13 gives monthly and annual precipitation for three locations in the county.

Precipitation during the growing season is 45 to 50 percent of the annual amount. From May through September, total precipitation ranges from 10 to 22 inches or more in the central valleys, and from 12 to 25 inches or more in the higher elevations near the Mohawk Valley in the north and the Catskill Mountains in the south. For the county in general, a total of from 14 to 18.5 inches can be expected in 7 years out of 10.

Average monthly precipitation ranges from 3.0 to 3.8 inches during the period from April through October. Long-term weather records indicate that, on the average, precipitation is not quite so great in June and August as it is in May, July, and September.

The amount and distribution of precipitation is normally adequate for the growth of most crops and other plants suited to the soils of the county. In most years, however, one or more periods of deficient rainfall occur, but usually they are so short that plants are not damaged. In one or two growing seasons out of ten, however, precipitation may be so inadequate that crop growth is seriously reduced.

During the growing season, precipitation is usually in the form of showers and thunderstorms that occur intermittently in a period of only a few hours. At times, however, steady but less intense rainfall results from general, slow-moving storms.

Precipitation amounting to 1 inch or more in 24 hours is to be expected in any month, but it is more likely during the growing season than in colder months. An inch or more of rain is expected on from 5 to 10 days per year. Two inches or more of precipitation per day are observed once or twice in most years, but a rain of more than 3 inches is rare. In winter precipitation occurs mostly in the form of snow, but at that time of the year it is not unusual for all or part of the precipitation to be in the form of rain or drizzle.

Although snow is abundant in Schoharie County, snowstorms are not so heavy as they are nearer the Great Lakes. In the lower valleys the average seasonal snowfall ranges from 55 to 65 inches, but a total of 80 inches or more is not uncommon. Very few winters have a total of less than 40 inches.

Snowfall is frequently heavy, in terms of both individual storms and monthly amounts. From December through March a monthly total of more than 20 inches falls with some frequency. The maximum monthly total on record is 45 inches. In most winters there is at least one storm of more than 6 inches, but the heavy snowstorms are not serious, because winds generally are not high and drifting on the roads is not severe.

Snowstorms usually occur in the first or middle part of November, and they continue until the middle of April. The ground is covered by 1 inch or more of snow almost continuously from early in December to the latter part of March. In most years the ground is generally covered for at least short periods in November and April. A period of thawing often occurs in midwinter, but because snowstorms are frequent the ground is seldom bare for more than a few days. For one or more periods during the winter, the depth of the snow is more than 12 inches. This depth is especially likely at the higher elevations and during winters that have at least average snowfall.

Clouds, wind, fog, and storms

In Schoharie County cloudiness is considerable in winter. An average of about 170 to 180 days per year are cloudy. About 15 to 20 of these days are in each month from November through March. Clear days total from 70 to 80 per year, and partly cloudy days total from 110 to 120. Observations at a weather station in a county nearby indicate that the amount of sunshine in Schoharie County ranges from 35 to 40 percent of the possible in November and December and from 60 to 65 percent of the possible in the summer months.

The prevailing wind is northerly during the colder months and is southerly or southwesterly during the growing season. Observations in a county nearby indicate that the average wind velocity is about 7 to 8 miles per hour from June through October, but this velocity increases to 10 to 12 miles per hour in winter and early in spring. Violent, damaging winds seldom occur, but occasionally winds in local areas may damage crops, property, or both in winter.

Dense fog occurs on an average of 10 to 20 days per year. During summer the relative humidity in the afternoon averages about 50 percent. Only a few times during summer is there an uncomfortable combination of high temperature and high relative humidity.

In terms of areas and number of people affected, the most severe storms are probably snowstorms. Comparatively rare, however, are blizzards characterized by heavy snowfall, very low visability, high winds, and sharply falling temperature.

Thunderstorms occur about 30 days per year. Locally these storms are accompanied by damaging winds, rains heavy enough to cause serious flooding or erosion, or both. Hail has occurred during some of the heaviest thunderstorms, but it is not a serious hazard to crops or property. From time to time property may be damaged in winter by freezing rain.

In general the county is not in the usual path of hurricanes, but a few hurricanes have passed so close that heavy rains and high winds have caused damage in the county.

The weather and field drying of hay

The object of drying hay in the field is removal of moisture from the plant material. Drying is favored by a combination of moderate to brisk winds, low relative humidity, abundant sunshine, warm temperature, and lack of precipitation.

Hay is dried in Schoharie County during the period of harvest, or from late in May until early in July. During this period the weather favors drying for 7 to 8 days out of 10. Daily records indicate that weather favorable for drying hay commonly persists for 4 to 6 successive days.

Water Supply

Supplies of water adequate for domestic and farm use are available throughout the county from wells and springs, but high-yielding wells have not been developed. Large supplies of water possibly could be obtained from the stratified sand and gravel deposits in the southern part of the county. It is doubtful, however, that permanent supplies large enough for industrial use could be obtained from the bedrock or glacial drift in the main valley or the northern part of the county (*4*).

Wells dug in till or clay yield water at a low to moderate rate, generally less than 10 gallons per minute. These wells are the first to go dry during periods of drought, and they often are dry late in summer. Beds of sand and gravel, however, are potential sources of large supplies of water. Wells in stratified sand and gravel generally yield more than 20 gallons of water per minute.

In bedrock, ground water is contained in joints, fractures, and bedding planes. The massive limestone in the northern part of the county has large openings, sinkholes, and caves. Drainage is underground, and there are several large springs in the limestone areas. The average yield from the limestone is about 10 gallons of water per minute, but wells intercepting enlarged joints in the limestone yield considerably more. The average yield from the Middle and Upper Devonian formations in the high plateau is about 15 gallons of water per minute. In the high plateau enough water for domestic and farm use can be obtained from drilled wells that are 250 feet or less deep.

The water from wells in limestone is commonly hard and contains objectionable minerals. The mineral springs at Sharon Springs flow from limestone and shale. The

water from sandstone and siltstone of the high plateau is not so hard as that from limestone. In Schoharie Valley the water from deep wells is hard. The quality of water from glacial till varies.

Springs are common in the uplands. Some of these springs issue from glacial till, especially where the till is in contact with bedrock or where permeable till overlies less permeable compact till. Springs also occur where limestone that has abundant joints is in contact with underlying less permeable shale. Springs are common where the siltstone of the Hamilton formation is in contact with beds of shale. Springs have highly variable yields. During drought, some springs go dry but others continue to yield more than 20 gallons of water per minute.

In Schoharie County all private and most public supplies of water are from wells and springs. Ground water is the source of six of the eight public supplies in the county. An estimated 500,000 gallons of water per day comes from ground water. Sources of surface water supply 800,000 gallons per day. Cobleskill obtains its water from a reservoir, near Mineral Springs, which has a capacity of about 10,000,000 gallons. Middleburg and Sharon Springs also obtain their water from surface sources. Richmondville, Central Bridge, West Conesville, and Jefferson are supplied by springs, but these villages store water in reservoirs. The village of Schoharie obtains most of its water from two springs, but it also has an auxiliary well adjacent to Fox Creek.

Physiography and Geology

Schoharie County is in the east-central part of New York, about 30 miles west of Albany. The county is a part of the glaciated Allegheny Plateau and extends southward from the lowlands of the Mohawk Valley to the northern ranges of the Catskill Mountains (*7*).

The northern part of the county is mainly a dissected limestone plateau at an average elevation of 1,200 feet. It is a westward extension of the Helderberg escarpment. The southern part of the county consists of a high plateau at an average elevation of 2,000 feet. The north-central escarpment of the Catskill Mountains extends into the southern part of the county in the form of steep hills that are approximately 600 feet above the general level of the high plateau. The low plateau in the northern part of the county is structurally a part of the high plateau, but on the low plateau erosion has been more rapid because the rocks are less resistant.

The entire county is underlain by sedimentary rocks that dip southward at 100 to 135 feet per mile. These rocks range from Middle Ordovician to Upper Devonian in age. They consist of sandstone, siltstone, limestone, and shale (*4*). The oldest rocks are in the northern part of the county, and the youngest are in the southern part. Because the bedrock strata dip gently southward, edges of resistant formations are exposed as steep, north-facing escarpments with long gentle slopes to the south. These escarpments are in the form of terraced, or "stair-stepped," hillsides because in the formations are thin beds of resistant material.

In the extreme northern part of the county, the low plateau is underlain by the brown sandstone and dark-gray shale of the Schenectady formation. The rest of the low plateau consists mostly of beds of resistant limestone, but there is some soft, fissile Marcellus shale. The central and southwestern parts of the high plateau are underlain by gray, medium- and fine-grained sandstone, thin-bedded siltstone, and dark-gray shale of the Gilboa and Hamilton formations. The southern and southeastern parts of the high plateau are underlain by red and gray, medium- and fine-grained sandstone and red and green shale of the Onteora formation.

During the Pleistocene epoch a great continental ice sheet advanced over the county from northeast to southwest and covered the tops of the highest mountains. The main effect of this glaciation on the existing topography was to round, smooth, and polish the hilltops, deepen the valleys, and deposit a blanket of till on the uplands. As the ice sheet moved southward, it disrupted the north-flowing streams and deepened and widened their valleys. It also filled and buried the east-west valleys with glacial drift. Also during this period of glaciations, ice moved eastward down the Mohawk Valley (*5*). The result of this eastward movement of ice was to impart a drumlinlike lineation to the topography in the northeastern part of the county. This linear topography consists of hills that are narrow in relation to their length and are elongated in an east-west direction. Some of the hills consist of glacial till, and others have thin veneers of till over bedrock cores. Some of the hills in this area are preglacial rock benches that have been smoothed, molded, and covered with glacial till.

As the glacier moved southward, it picked up and transported fragments of bedrock over which it passed. When the ice melted, this debris was exposed. Some of it was deposited directly by the ice, and some was deposited by streams flowing from the ice. Streams flowing from the ice deposited coarse sand and gravel in strata. Fine-grained silt and clay were deposited in glacial lakes. Debris deposited directly by the ice is called glacial till. It consists of fragments of local bedrock and smaller amounts of rocks that have come from other places. In Schoharie County the glacial till consists mostly of local sedimentary rock that is mixed with some metamorphic and igneous rocks from the Adirondack region to the north. The till in the low plateau region of the county contains much clay because large amounts of limestone and shale bedrock are in the Mohawk Valley and the northern part of the county.

Glacial till occurs throughout the county except where it has been removed by erosion. In many places it is beneath other Pleistocene deposits of sand, gravel, silt, and clay. On the high pleateau, glacial till is generally less than 30 feet thick, but on the drumlinlike areas of the low plateau, it is more than 100 feet thick in some places.

Sand and gravel deposited by glacial streams occur as kames, eskers, outwash plains, terraces, and deltas. Kames and deltas occur near Jefferson and Broome Center.

Silt and clay were deposited in the still waters of glacial lakes that were formed when the ice blocked the Schoharie Valley and many small valleys in the county. Reddish silt and clay were derived from the red beds of the Onteora formation. Much of the clay in the county is dark brown or brown and was derived from gray and brown sedimentary rocks. Most of the lake-laid clay is confined to the Schoharie and Cobleskill Valleys.

Deposits of gravel, sand, and silt were laid down recently along the banks and flats of the larger streams, such

as Schoharie, Cobleskill, Fox, West, and Catskill Creeks and the Charlotte River. These deposits were derived from reworked glacial drift, and they are confined to the immediate vicinity of the streams that deposit them.

The central part of the county lies in the drainage basin of Schoharie Creek and its main tributaries, Fox and Cobleskill Creeks. Schoharie Creek rises in the Catskill Mountains south of the county, flows northward, and empties into the Mohawk River in Montgomery County. It is the largest stream in the county and flows in a deep valley that is entrenched 500 to 800 feet below the adjacent uplands of the high plateau. Fox and Cobleskill Valleys, which are filled with glacial drift, are not so deep. A small area in the southwestern part of the county is drained by the Charlotte River, which flows into the drainage basin of the Susquehanna River to the west. In the eastern part of the county a small area near Franklinton is drained by Catskill Creek which flows into the Hudson River.

Throughout most of the county the drainage pattern is dendritic, though limestone strata have modified the drainage in parts of the low plateau. In the limestone area much of the drainage is underground through sinkholes and caves in the limestone. Surface streams are short or absent, and sinks are common. In the northeastern part of the low plateau where there are elongated east-west drumlinlike hills and ridges, the drainage pattern is trellised, and the flow of the minor streams and headstreams is eastward or westward. Of the streams that enter Schoharie Creek, most of them from the west enter at an acute angle downstream and most of them from the east enter at an acute angle upstream. In many places these streams are opposite each other, in positions that suggest structural control by the northwest-southeast joints in the bedrock.

The most recent change in drainage was brought about by the construction of Gilboa Dam. Gilboa Dam created a reservoir 5 miles long. Much of the water is diverted from the upper part of Schoharie Creek through the Shandaken Tunnel southward to New York City instead of permitting flow northward via Schoharie Creek to the Mohawk River. This diversion has reduced the flow in Schoharie Creek, and it may affect the rate of stream erosion in Schoharie Valley.

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1953. THE UNIFIED SOIL CLASSIFICATION SYSTEM. Tech. Memo. No. 3–357, 2 v. and appendix, 44 pp., illus.

Glossary

Acidity. See reaction.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; but that in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate. Many fine particles of soil held in a single mass or cluster, such as a clod, crumb, block, or a prism.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available moisture capacity. The approximate amount of capillary water in the soil when wet to field capacity, in inches per inch of soil depth. When the soil is "air dry", this amount of moisture will wet the soil material described to a depth of 1 inch without deeper percolation.

Base saturation. The degree to which a material is saturated with exchangeable cations other than hydrogen, expressed as a percentage of the cation-exchange capacity.

Bedding. Plowing, grading, or otherwise elevating the surface of a flat field into a series of broad beds, or "lands," so as to leave shallow surface drains between the beds.

Bearing capacity. The unit load that can be placed on a soil without detrimental deformation to the structure to be supported—it is usually expressed in tons or pounds per square foot.

Calcareous, soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Catena. A sequence, or "chain," of soils on a landscape, developed from one kind of parent material but having different characteristics because of differences in relief and drainage.

Channery, soil. A soil that contains thin, flat fragments of sandstone, limestone, or schist, as much as 6 inches in length along the longer axis. A single piece is called a fragment.

Chroma. One of three variables of color. The relative purity or strength of the spectral color.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Congeliturbate. Soil disturbed by frost action.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent; soil will not hold together in a mass.

Friable.—When moist, soil crushes under gentle to moderate pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, soil crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, soil is readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, soil adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, soil is moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, soil breaks into powder or individual grains under very slight pressure.

Cemented.—Soil is hard and brittle; little affected by moistening.

Cover crop. A close-growing crop grown primarily to improve and to protect the soil between periods of regular crop production; or a crop grown between trees and vines in orchards and vineyards.

Diversion. A ridge of earth, generally a terrace, that is built to divert runoff from its natural course and, thus, to protect areas downslope from the effects of such runoff.

Eluviation. The movement of material from one place to another within the soil, in either true solution or colloidal suspension. Soil horizons that have lost material through eluviation are said to be eluvial; those that have received material are illuvial.

Fragipan. A loamy, brittle, subsurface horizon that is very low in organic matter and clay but is rich in silt or very fine sand. The layer is seemingly cemented when dry, has a hard or very hard consistence, and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur below the B horizon, 15 to 40 inches below the surface.

Glacial drift (geology). Rock material transported by glacial ice and then deposited; also includes the assorted and unassorted materials deposited by streams flowing from glaciers.

Glacial till (geology). Unassorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice; the deposits are stratified and occur in the form of kames, eskers, deltas, and outwash plains.

Gleization. The reduction, translocation, and segregation of soil compounds, notably of iron, usually in the subsoil or substratum, as a result of poor aeration and drainage; expressed in the soil by mottled colors dominated by gray. The soil-forming processes leading to the development of a gley soil.

Graded stripcropping. Growing crops in strips that are slightly graded to drain into a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, and covered by grass for protection against erosion; used to conduct surface water away from cropland.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and it is therefore marked by the accumulation of humus. The horizon may have lost one or more of the following: soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has (1) distinctive characteristics caused by accumulation of clay, sequioxides, humus, or some combination of these: (2) prismatic or blocky structure; (3) redder or stronger colors than the A horizon; or (4) some combination of these. The combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. This layer, commonly called the soil parent material is presumed to be like that from which the overlying horizons were formed in most soils. If the underlying material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath the A or B horizon.

Illuviation. The process of deposition of soil material removed from one horizon to another horizon of the soil.

Intergrade. Soils that possess moderately well developed distinguishing characteristics of two or more soil groups.

Internal drainage. The downward movement of water through the soil profile. The rate of movement is determined by the texture, structure, and other characteristics of the soil profile and underlying layers, and by the height of the water table, either permanent or perched. Relative terms for expressing internal drainage are *none, very slow, slow, medium, rapid,* and *very rapid.*

Leaching, soil. The removal of soluble materials from soils or other material by percolating water.

Loess. A fine-grained eolian deposit consisting dominantly of silt-sized particles.

Metamorphic rocks. Rocks of any origin that have been completely changed physically by heat, pressure, and movement. Such rocks are nearly always crystalline.

Morphology, soil. The makeup of the soil, including the texture, structure, consistence, color, and other physical, mineralogical, and biological properties of the various horizons that make up the soil profile.

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, value of 6, and a chroma of 4.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeability are as follows: *Very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material. See Horizon, soil.

Reaction, soil. The degree of acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly Alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above

the solid rock. Only the upper part of this, modified by organisms and other soil-building forces, is regarded by soil scientists as soil. Most American engineers speak of the whole regolith, even to great depths, as "soil."

Relief. The elevations or inequalities of a land surface, considered collectively.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Sedimentary rock. A rock composed of particles deposited from suspension in water. The chief sedimentary rocks are conglomerate, from gravel; sandstone, from sand; shale, from clay; and limestone, from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sands have been consolidated into sandstone.

Series, soil. A group of soils developed from a particular type of parent material and having genetic horizons that, except for texture of the surface soil, are similar in differentiating characteristics and in arrangement in the profile.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate, and living matter acting upon parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. In many soils, technically, the B horizon; roughly, the part of the profile below plow depth.

Substratum. Any layer lying beneath the solum, or true soil; the C or D horizon.

Sugar bush. A grove of sugar maple trees tapped for sap, which is made into maple sirup or sugar. Also called a bush.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Talus. Fragments of rock and other soil material accumulated by force of gravity at the foot of cliffs or steep slopes.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called *second bottoms*, as contrasted to *flood plains*, and are subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportions of fine particles are as follows: sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Type, soil. A subdivision of the soil series that is made on the basis of differences in the texture of the surface layer.

Varves. Distinctly marked annual deposits of sediment, regardless of their origin.

V-ditches. Drainage ditches that are V-shaped and have smooth side slopes.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and the soil series to which the mapping unit belongs. Other information is given in tables as follows:

Estimated yields, table 1, p. 20.
Woodland suitability groups, table 2, p. 24.
Suitability of soils for wildlife, table 3, p. 26.
Engineering uses of soils, tables 4, 5, and 6, pp. 32 through 55.
Nonfarm uses of soils, table 7, p. 60.
Acreage and extent, table 8, p. 79.

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group
			Symbol	Page	Number
Al	Alluvial land	81	Vw-1	18	--
ApB	Appleton channery silt loam, 2 to 8 percent slopes	81	IIIw-5	15	5
ArC	Arnot flaggy silt loam, 0 to 15 percent slopes	82	IIIs-1	15	9
Ba	Barbour and Tioga fine sandy loams	83	I-2	9	2
BbB	Barbour and Tioga gravelly loams, fans, 0 to 8 percent slopes	83	IIe-2	10	2
Bg	Barbour and Tioga loams	83	I-2	9	2
Bm	Basher and Middlebury silt loams	84	IIw-2	11	2
BrB	Burdett and Erie channery silt loams, 3 to 8 percent slopes	84	IIIw-4	15	5
BrC	Burdett and Erie Channery silt loams, 8 to 15 percent slopes	84	IIIe-11	14	5
CaD	Cattaraugus stony silt loam, 15 to 25 percent slopes	85	IVe-3	16	3
CaE	Cattaraugus stony silt loam, 25 to 35 percent slopes	85	VIe-1	18	4
ChA	Chippewa and Norwich stony silt loams, 0 to 3 percent slopes	86	IVw-3	17	10
ChC	Chippewa and Norwich stony silt loams, 3 to 15 percent slopes	86	IVw-3	17	10
CnC	Chippewa and Norwich very stony soils, 0 to 15 percent slopes	86	VIIs-2	19	10
CoB	Conesus channery silt loam, 2 to 10 percent slopes	87	IIe-4	10	1
CoC	Conesus channery silt loam, 10 to 20 percent slopes	87	IIIe-5	12	1
CuB	Culvers stony silt loam, 2 to 8 percent slopes	87	IIe-6	11	2
CuC	Culvers stony silt loam, 8 to 15 percent slopes	88	IIIe-6	13	3
CuD	Culvers stony silt loam, 15 to 25 percent slopes	88	IVe-3	16	3
DaB	Darien channery silt loam, 2 to 8 percent slopes	88	IIIw-4	15	5
DaC	Darien channery silt loam, 8 to 15 percent slopes	88	IIIe-9	13	5
DcC3	Darien channery silty clay loam, 8 to 15 percent slopes, eroded	88	IVe-5	16	6
DdB	Darien silt loam, gently undulating, 2 to 8 percent slopes	89	IIe-5	10	1
DdC	Darien silt loam, undulating, 8 to 15 percent slopes	89	IIIe-5	12	1
DdD	Darien silt loam, undulating, 15 to 25 percent slopes	89	IVe-7	17	1
DeB	Darien silt loam, 2 to 8 percent slopes	89	IIIw-4	15	5
DeC	Darien silt loam, 8 to 15 percent slopes	89	IIIe-9	13	5
DsB3	Darien silty clay loam, 2 to 8 percent slopes, eroded	89	IIIe-12	14	6
DuC3	Darien silty clay loam, undulating, 8 to 15 percent slopes, eroded	89	IVe-2	16	6
FaB	Farmington very rocky silt loam, 0 to 10 percent slopes	90	VIs-3	18	9
FaF	Farmington very rocky silt loam, 10 to 70 percent slopes	91	VIIs-1	18	--
Fh	Fredon and Halsey gravelly loams	91	IIIw-1	14	8
Ha	Holly and Papakating silt loams	92	IVw-4	18	--
HfB	Honeoye-Farmington complex, 2 to 10 percent slopes	92	IIe-1	10	1
HfC	Honeoye-Farmington complex, 10 to 20 percent slopes	93	IIIe-1	12	1
HgA	Howard gravelly silt loam, 0 to 5 percent slopes	93	I-1	9	2
HgC	Howard gravelly silt loam, 5 to 15 percent slopes	93	IIIe-2	12	2
IaB	Ilion and Appleton silt loams, 3 to 8 percent slopes	94	IVw-2	17	8
IlA	Ilion and Lyons silt loams, 0 to 3 percent slopes	94	IVw-1	17	8
IlC	Ilion and Lyons silt loams, 3 to 15 percent slopes	95	IVw-2	17	8
LaA	Lakemont and Madalin soils, deep, 0 to 2 percent slopes	95	IVw-1	17	8

Map symbol	Mapping unit	Described on page	Capability unit Symbol	Capability unit Page	Woodland suitability group Number
LdB	Lakemont and Madalin silty clay loams, 2 to 6 percent slopes	95	IVw-2	17	8
LhB	Lansing channery silt loam, 2 to 10 percent slopes	96	IIe-1	10	1
LhC	Lansing channery silt loam, 10 to 20 percent slopes	96	IIIe-1	12	1
LhC3	Lansing channery silt loam, 10 to 20 percent slopes, eroded	96	IVe-2	16	1
LmA	Lordstown channery silt loam, 0 to 5 percent slopes	97	IIs-1	11	3
LmC	Lordstown channery silt loam, 5 to 15 percent slopes	97	IIIe-3	12	3
LmD	Lordstown channery silt loam, 15 to 25 percent slopes	98	IVe-3	16	3
LmE	Lordstown channery silt loam, 25 to 35 percent slopes	98	VIIe-1	18	4
LnB	Lordstown silt loam, 0 to 8 percent slopes	98	IIe-3	10	3
LoE	Lordstown and Oquaga very stony soils, 0 to 35 percent slopes	98	VIIs-1	18	9
LrF	Lordstown, Oquaga and Nassau soils, 35 to 70 percent slopes	98	VIIs-1	18	4
LsB	Lyons silt loam, shallow, 0 to 8 percent slopes	99	IVw-3	17	8
LyB	Lyons and Ilion very stony soils, 0 to 8 percent slopes	99	VIIs-2	19	8
Ma	Madalin silt loam, over till	99	IVw-1	17	8
McB	Mardin channery silt loam, 2 to 8 percent slopes	100	IIe-6	11	3
McC	Mardin channery silt loam, 8 to 15 percent slopes	100	IIIe-6	13	3
McC3	Mardin channery silt loam, 8 to 15 percent slopes, eroded	100	IVe-4	16	7
McD	Mardin channery silt loam, 15 to 25 percent slopes	100	IVe-3	16	3
McE	Mardin channery silt loam, 25 to 35 percent slopes	100	VIe-1	18	4
MdF	Mardin and Cattaraugus soils, 35 to 70 percent slopes	101	VIIe-1	18	4
MeE	Mardin and Culvers very stony soils, 0 to 35 percent slopes	101	VIIs-2	19	3
MhC	Mohawk and Honeoye silt loams, 10 to 20 percent slopes	102	IIIe-1	12	1
MhC3	Mohawk and Honeoye silt loams, 10 to 20 percent slopes, eroded	102	IVe-2	16	1
MhD	Mohawk and Honeoye silt loams, 20 to 30 percent slopes	102	IVe-1	16	1
MhF	Mohawk and Honeoye soils, 30 to 50 percent slopes	102	VIIe-1	18	1
MkC	Mohawk and Lansing very stony silt loams, 3 to 20 percent slopes	102	VIs-2	18	1
MkD	Mohawk and Lansing very stony silt loams, 20 to 30 percent slopes	102	VIs-2	18	1
MlB	Mohawk and Lima silt loams, 2 to 10 percent slopes	103	IIe-4	10	1
MlB3	Mohawk and Lima silt loams, 2 to 10 percent slopes, eroded	103	IIIe-4	12	1
MoB	Morris stony silt loam, 2 to 8 percent slopes	103	IIIw-4	15	7
MoC	Morris stony silt loam, 8 to 15 percent slopes	103	IIIe-11	14	7
Ms	Muck, slightly acid	104	VIIw-1	18	--
Mu	Muck and Peat, strongly acid	104	VIIw-1	18	--
NaC	Nassau shaly silt loam, 2 to 15 percent slopes	104	IIIs-1	15	9
NaE	Nassau shaly silt loam, 15 to 35 percent slopes	104	VIs-1	18	9
NdB	Nunda channery silt loam, 3 to 10 percent slopes	105	IIe-5	10	1
NdC	Nunda channery silt loam, 10 to 20 percent slopes	105	IIIe-5	12	1
NdC3	Nunda channery silt loam, 10 to 20 percent slopes, eroded	105	IVe-2	16	1
NdD	Nunda channery silt loam, 20 to 30 percent slopes	106	IVe-7	17	1
NdD3	Nunda channery silt loam, 20 to 30 percent slopes, eroded	106	VIe-1	18	1
NlB	Nunda and Langford channery silt loams, 3 to 8 percent slopes	106	IIe-6	11	1
NlC	Nunda and Langford channery silt loams, 8 to 15 percent slopes	106	IIIe-6	13	1
NlC3	Nunda and Langford channery silt loams, 8 to 15 percent slopes, eroded	106	IVe-4	16	1

Map symbol	Mapping unit	Described on page	Capability unit Symbol	Capability unit Page	Woodland suitability group Number
NlD	Nunda and Langford channery silt loams, 15 to 25 percent slopes	106	IVe-3	16	1
OdA	Odessa and Rinebeck silt loams, 0 to 2 percent slopes	107	IIIw-3	15	5
OdB	Odessa and Rinebeck silt loams, 2 to 6 percent slopes	107	IIIw-3	15	5
OdC	Odessa and Rinebeck silt loams, 6 to 12 percent slopes	107	IIIe-10	13	5
OrC3	Odessa and Rinebeck silty clay loams, 6 to 12 percent slopes, eroded	107	IVe-5	16	6
OsC	Oquaga stony silt loam 3 to 15 percent slopes	108	IIIe-3	12	3
OsD	Oquaga stony silt loam, 15 to 25 percent slopes	108	IVe-3	16	3
OsE	Oquaga stony silt loam, 25 to 35 percent slopes	108	VIe-1	18	4
PhA	Phelps gravelly silt loam, 0 to 5 percent slopes	109	IIw-1	11	2
PlB	Phelps gravelly silt loam, clay substratum, 2 to 8 percent slopes	109	IIe-4	10	2
Rh	Red Hook gravelly silt loam	109	IIIw-1	14	5
ScA	Scio silt loam, 0 to 3 percent slopes	112	IIw-1	11	2
ShB	Schoharie and Hudson silt loams, 2 to 6 percent slopes	110	IIe-5	10	1
ShC	Schoharie and Hudson silt loams, 6 to 12 percent slopes	110	IIIe-7	13	1
SnB3	Schoharie and Hudson silty clay loams, 2 to 6 percent slopes, eroded	111	IIIe-8	13	1
SnC3	Schoharie and Hudson silty clay loams, 6 to 12 percent slopes, eroded	111	IVe-6	17	1
SnD3	Schoharie and Hudson silty clay loams, 12 to 20 percent slopes, eroded	111	VIe-1	18	1
SoE	Schoharie soils, 20 to 40 percent slopes	111	VIe-1	18	--
TaB	Tuller and Allis silt loams, 0 to 8 percent slopes	112	IVw-3	17	10
TaC	Tuller and Allis silt loams, 8 to 15 percent slopes	112	IVw-3	17	10
TcA	Tunkhannock and Chenango gravelly loams, fans, 0 to 5 percent slopes	113	I-1	9	2
TcC	Tunkhannock and Chenango gravelly silt loams, fans, 5 to 15 percent slopes	113	IIIe-2	12	2
ThA	Tunkhannock and Chenango gravelly silt loams, 0 to 5 percent simple slopes	113	I-1	9	2
ThC	Tunkhannock and Chenango gravelly silt loams, 5 to 15 percent simple slopes	113	IIIe-2	12	2
ThCK	Tunkhannock and Chenango gravelly silt loams, 3 to 15 percent complex slopes	114	IIIe-2	12	2
ThD	Tunkhannock and Chenango gravelly silt loams, 15 to 25 percent slopes	114	IVe-8	17	2
TkC	Tunkhannock and Chenango soils, non-stratified, 3 to 15 percent slopes	114	IIIe-2	12	2
TkD	Tunkhannock and Chenango soils, non-stratified, 15 to 35 percent slopes	114	IVe-8	17	2
TnF	Tunkhannock and Chenango soils, 25 to 60 percent slopes	114	VIIe-1	18	--
TuA	Tunkhannock cobbly sandy loam, 0 to 5 percent slopes	114	IIs-2	11	2
VcA	Volusia channery silt loam, 0 to 3 percent slopes	115	IIIw-2	14	7
VcB	Volusia channery silt loam, 3 to 8 percent slopes	115	IIIw-4	15	7
VcC	Volusia channery silt loam, 8 to 15 percent slopes	115	IIIe-11	14	7
VmC	Volusia, Morris and Erie very stony soils, 0 to 15 percent slopes	115	VIIs-2	19	7
Wa	Wayland silt loam	116	IVw-4	18	--

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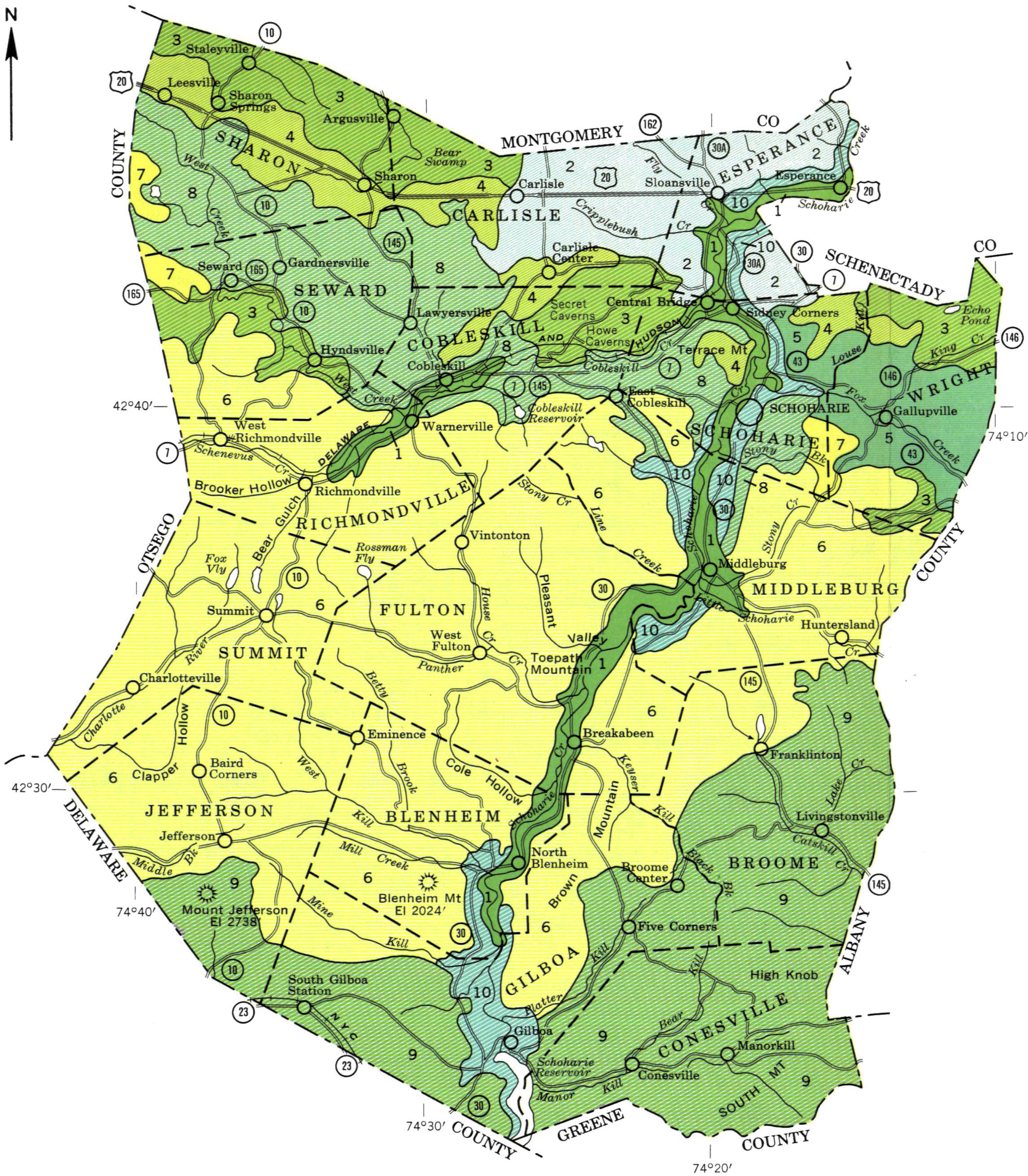


U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
CORNELL UNIVERSITY AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

SCHOHARIE COUNTY, NEW YORK

SCALE IN MILES
1 0 1 2 3 4

SOIL ASSOCIATIONS

1 — Barbour–Basher–Middlebury association: Deep, nearly level, mainly well drained and moderately well drained soils of the bottom lands

2 — Burdett–Erie–Nunda–Langford association: Deep, gently sloping to moderately steep, mainly somewhat poorly drained and moderately well drained, medium–lime and low–lime soils of the uplands

3 — Darien–Nunda association: Deep, nearly level to moderately steep, somewhat poorly drained to well–drained, medium–lime soils of the uplands

4 — Honeoye–Farmington association: Deep and shallow, nearly level to steep, well–drained to excessively drained, high–lime soils of the uplands

5 — Lansing–Appleton association: Deep, gently sloping to moderately steep, well–drained to somewhat poorly drained, medium–lime soils of the uplands

6 — Lordstown–Marain association: Yellowish–brown, moderately deep and deep, nearly level to steep, well drained to moderately well drained, strongly acid soils of the uplands

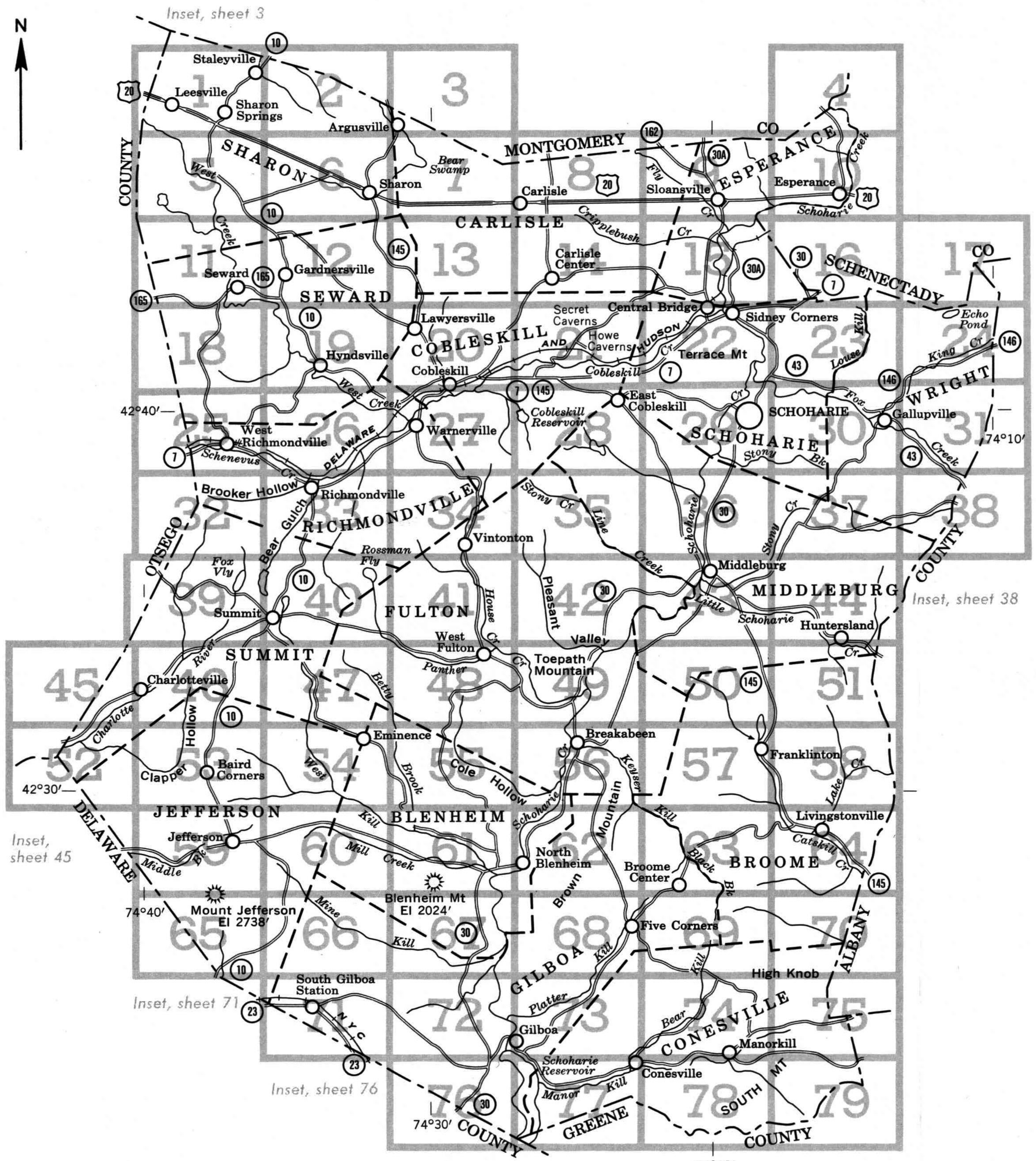
7 — Nassau association: Shallow, nearly level to steep, well–drained, strongly acid, shaly soils of the uplands

8 — Mohawk–Honeoye association: Deep, gently sloping to steep, well drained and moderately well drained, high–lime soils of the uplands

9 — Oquaga–Culvers–Morris association: Reddish, moderately deep and deep, nearly level to steep, well–drained to somewhat poorly drained, strongly acid soils of the uplands

10 — Schoharie association: Deep, nearly level to steep, mainly moderately well drained to well drained soils in old lakebeds

July 1968



INDEX TO MAP SHEETS

SCHOHARIE COUNTY, NEW YORK

SCALE IN MILES
1 0 1 2 3 4

Original text from each map sheet:
"This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station."

SOIL LEGEND

The first capital letter is the initial one of the soil name. A second capital letter, A, B, C, D, E or F, is a general guide to the slope class. A fourth letter, capital K, in a symbol shows that the slope is complex. Symbols without a slope letter are for those miscellaneous land types or soils where slope is not significant to use and management. A final number, 3, in the symbol shows that the soil is eroded.

SYMBOL	NAME
Al	Alluvial land
ApB	Appleton channery silt loam, 2 to 8 percent slopes
ArC	Arnot flaggy silt loam, 0 to 15 percent slopes
Ba	Barbour and Tioga fine sandy loams
BbB	Barbour and Tioga gravelly loams, fans, 0 to 8 percent slopes
Bg	Barbour and Tioga loams
Bm	Basher and Middlebury silt loams
BrB	Burdett and Erie channery silt loams, 3 to 8 percent slopes
BrC	Burdett and Erie channery silt loams, 8 to 15 percent slopes
CaD	Cattaraugus stony silt loam, 15 to 25 percent slopes
CaE	Cattaraugus stony silt loam, 25 to 35 percent slopes
ChA	Chippewa and Norwich stony silt loams, 0 to 3 percent slopes
ChC	Chippewa and Norwich stony silt loams, 3 to 15 percent slopes
CnC	Chippewa and Norwich very stony soils, 0 to 15 percent slopes
CoB	Conesus channery silt loam, 2 to 10 percent slopes
CoC	Conesus channery silt loam, 10 to 20 percent slopes
CuB	Culvers stony silt loam, 2 to 8 percent slopes
CuC	Culvers stony silt loam, 8 to 15 percent slopes
CuD	Culvers stony silt loam, 15 to 25 percent slopes
DaB	Darien channery silt loam, 2 to 8 percent slopes
DaC	Darien channery silt loam, 8 to 15 percent slopes
DcC3	Darien channery silty clay loam, 8 to 15 percent slopes, eroded
DdB	Darien silt loam, gently undulating, 2 to 8 percent slopes
DdC	Darien silt loam, undulating, 8 to 15 percent slopes
DdD	Darien silt loam, undulating, 15 to 25 percent slopes
DeB	Darien silt loam, 2 to 8 percent slopes
DeC	Darien silt loam, 8 to 15 percent slopes
DsB3	Darien silty clay loam, 2 to 8 percent slopes, eroded
DuC3	Darien silty clay loam, undulating, 8 to 15 percent slopes, eroded
FaB	Farmington very rocky silt loam, 0 to 10 percent slopes
FaF	Farmington very rocky silt loam, 10 to 70 percent slopes
Fh	Fredon and Halsey gravelly loams
Ha	Holly and Papakating silt loams
HfB	Honeoye–Farmington complex, 2 to 10 percent slopes
HfC	Honeoye–Farmington complex, 10 to 20 percent slopes
HgA	Howard gravelly silt loam, 0 to 5 percent slopes
HgC	Howard gravelly silt loam, 5 to 15 percent slopes
IaB	Ilion and Appleton silt loams, 3 to 8 percent slopes
IlA	Ilion and Lyons silt loams, 0 to 3 percent slopes
IlC	Ilion and Lyons silt loams, 3 to 15 percent slopes
LaA	Lakemont and Madalin soils, deep, 0 to 2 percent slopes
LdB	Lakemont and Madalin silty clay loams, 2 to 6 percent slopes

SYMBOL	NAME
LhB	Lansing channery silt loam, 2 to 10 percent slopes
LhC	Lansing channery silt loam, 10 to 20 percent slopes
LhC3	Lansing channery silt loam, 10 to 20 percent slopes, eroded
LmA	Lordstown channery silt loam, 0 to 5 percent slopes
LmC	Lordstown channery silt loam, 5 to 15 percent slopes
LmD	Lordstown channery silt loam, 15 to 25 percent slopes
LmE	Lordstown channery silt loam, 25 to 35 percent slopes
LnB	Lordstown silt loam, 0 to 8 percent slopes
LoE	Lordstown and Oquaga very stony soils, 0 to 35 percent slopes
LrF	Lordstown, Oquaga and Nassau soils, 35 to 70 percent slopes
LsB	Lyons silt loam, shallow, 0 to 8 percent slopes
LyB	Lyons and Ilion very stony soils, 0 to 8 percent slopes
Ma	Madalin silt loam, over till
McB	Mardin channery silt loam, 2 to 8 percent slopes
McC	Mardin channery silt loam, 8 to 15 percent slopes
McC3	Mardin channery silt loam, 8 to 15 percent slopes, eroded
McD	Mardin channery silt loam, 15 to 25 percent slopes
McE	Mardin channery silt loam, 25 to 35 percent slopes
MdF	Mardin and Cattaraugus soils, 35 to 70 percent slopes
MeE	Mardin and Culvers very stony soils, 0 to 35 percent slopes
MhC	Mohawk and Honeoye silt loams, 10 to 20 percent slopes
MhC3	Mohawk and Honeoye silt loams, 10 to 20 percent slopes, eroded
MhD	Mohawk and Honeoye silt loams, 20 to 30 percent slopes
MhF	Mohawk and Honeoye soils, 30 to 50 percent slopes
MkC	Mohawk and Lansing very stony silt loams, 3 to 20 percent slopes
MkD	Mohawk and Lansing very stony silt loams, 20 to 30 percent slopes
MlB	Mohawk and Lima silt loams, 2 to 10 percent slopes
MlB3	Mohawk and Lima silt loams, 2 to 10 percent slopes, eroded
MoB	Morris stony silt loam, 2 to 8 percent slopes
MoC	Morris stony silt loam, 8 to 15 percent slopes
Ms	Muck, slightly acid
Mu	Muck and Peat, strongly acid
NaC	Nassau shaly silt loam, 2 to 15 percent slopes
NaE	Nassau shaly silt loam, 15 to 35 percent slopes
NdB	Nunda channery silt loam, 3 to 10 percent slopes
NdC	Nunda channery silt loam, 10 to 20 percent slopes
NdC3	Nunda channery silt loam, 10 to 20 percent slopes, eroded
NdD	Nunda channery silt loam, 20 to 30 percent slopes
NdD3	Nunda channery silt loam, 20 to 30 percent slopes, eroded
NlB	Nunda and Langford channery silt loams, 3 to 8 percent slopes
NlC	Nunda and Langford channery silt loams, 8 to 15 percent slopes
NlC3	Nunda and Langford channery silt loams, 8 to 15 percent slopes, eroded
NlD	Nunda and Langford channery silt loams, 15 to 25 percent slopes

SYMBOL	NAME
OdA	Odessa and Rhinebeck silt loams, 0 to 2 percent slopes
OdB	Odessa and Rhinebeck silt loams, 2 to 6 percent slopes
OdC	Odessa and Rhinebeck silt loams, 6 to 12 percent slopes
OrC3	Odessa and Rhinebeck silty clay loams, 6 to 12 percent slopes, eroded
OsC	Oquaga stony silt loam, 3 to 15 percent slopes
OsD	Oquaga stony silt loam, 15 to 25 percent slopes
OsE	Oquaga stony silt loam, 25 to 35 percent slopes
PhA	Phelps gravelly silt loam, 0 to 5 percent slopes
PlB	Phelps gravelly silt loam, clay substratum, 2 to 8 percent slopes
Rh	Red Hook gravelly silt loam
ScA	Scio silt loam, 0 to 3 percent slopes
ShB	Schoharie and Hudson silt loams, 2 to 6 percent slopes
ShC	Schoharie and Hudson silt loams, 6 to 12 percent slopes
SnB3	Schoharie and Hudson silty clay loams, 2 to 6 percent slopes, eroded
SnC3	Schoharie and Hudson silty clay loams, 6 to 12 percent slopes, eroded
SnD3	Schoharie and Hudson silty clay loams, 12 to 20 percent slopes, eroded
SoE	Schoharie soils, 20 to 40 percent slopes
TaB	Tuller and Allis silt loams, 0 to 8 percent slopes
TaC	Tuller and Allis silt loams, 8 to 15 percent slopes
TcA	Tunkhannock and Chenango gravelly loams, fans, 0 to 5 percent slopes
TcC	Tunkhannock and Chenango gravelly loams, fans, 5 to 15 percent slopes
ThA	Tunkhannock and Chenango gravelly silt loams, 0 to 5 percent simple slopes
ThC	Tunkhannock and Chenango gravelly silt loams, 5 to 15 percent simple slopes
ThCK	Tunkhannock and Chenango gravelly silt loams, 3 to 15 percent complex slopes
ThD	Tunkhannock and Chenango gravelly silt loams, 15 to 25 percent slopes
TkC	Tunkhannock and Chenango soils, non–stratified, 3 to 15 percent slopes
TkD	Tunkhannock and Chenango soils, non–stratified, 15 to 35 percent slopes
TnF	Tunkhannock and Chenango soils, 25 to 60 percent slopes
TuA	Tunkhannock cobbly sandy loam, 0 to 5 percent slopes
VcA	Volusia channery silt loam, 0 to 3 percent slopes
VcB	Volusia channery silt loam, 3 to 8 percent slopes
VcC	Volusia channery silt loam, 8 to 15 percent slopes
VmC	Volusia, Morris and Erie very stony soils, 0 to 15 percent slopes
Wa	Wayland silt loam

Soil map constructed 1967 by Cartographic Division, Soil Conservation Service, USDA, from 1961 aerial photographs. Controlled mosaic based on New York plane coordinate system, east zone, transverse Mercator projection, 1927 North American datum.

1

(Joins inset, sheet 3)

(Joins sheet 5)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

2

N

(Joins sheet 1)

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(Joins sheet 6)

0 ½ 1 Mile

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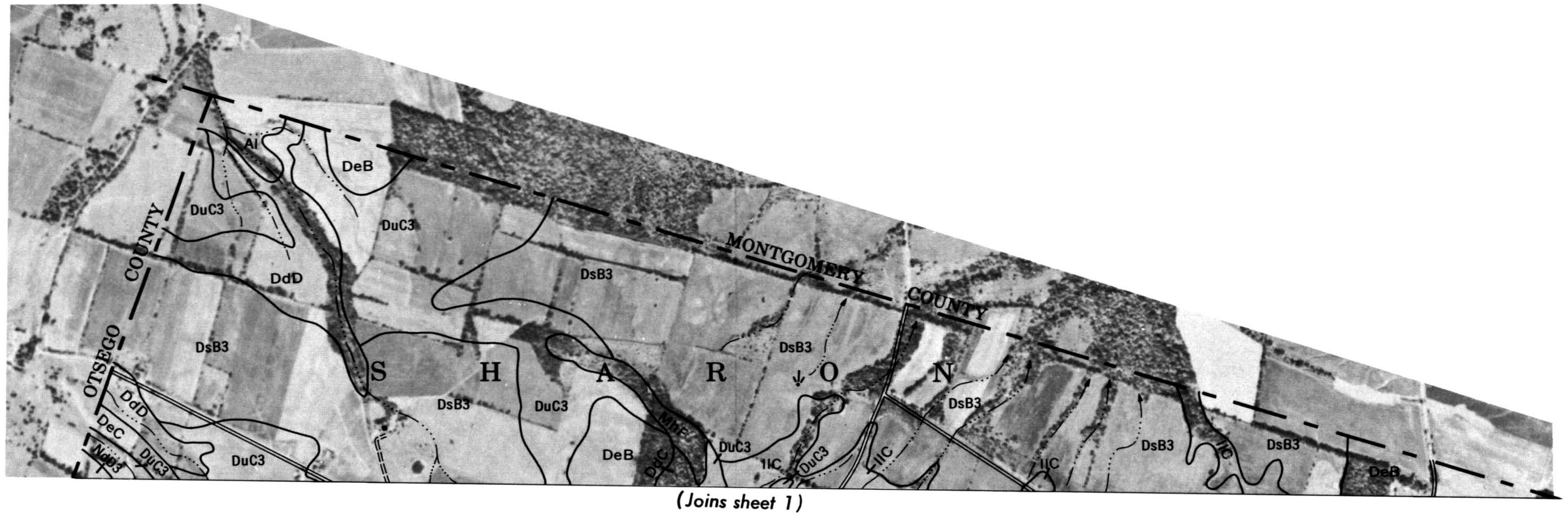

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N

(Joins sheet 10)

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SCHOHARIE COUNTY, NEW YORK NO. 4

(Joins sheet 1)

5

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(Joins sheet 6)

(Joins sheet 11)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

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(Joins sheet 5)

(Joins sheet 7)

(Joins sheet 12)

0 ½ 1 Mile

Scale 1:15 840

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Scale 1:15 840
0 5 000 Feet

8

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(Joins sheet 7)

(Joins sheet 9)

(Joins sheet 14)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

(Joins sheet 8)

(Joins sheet 10)

(Joins sheet 15)

0 ½ 1 Mile Scale 1:15 840 0 5 000 Feet

10

(Joins sheet 4)

(Joins sheet 9)

0 ½ 1 Mile Scale 1:15 840 0 5 000 Feet

(Joins sheet 5)

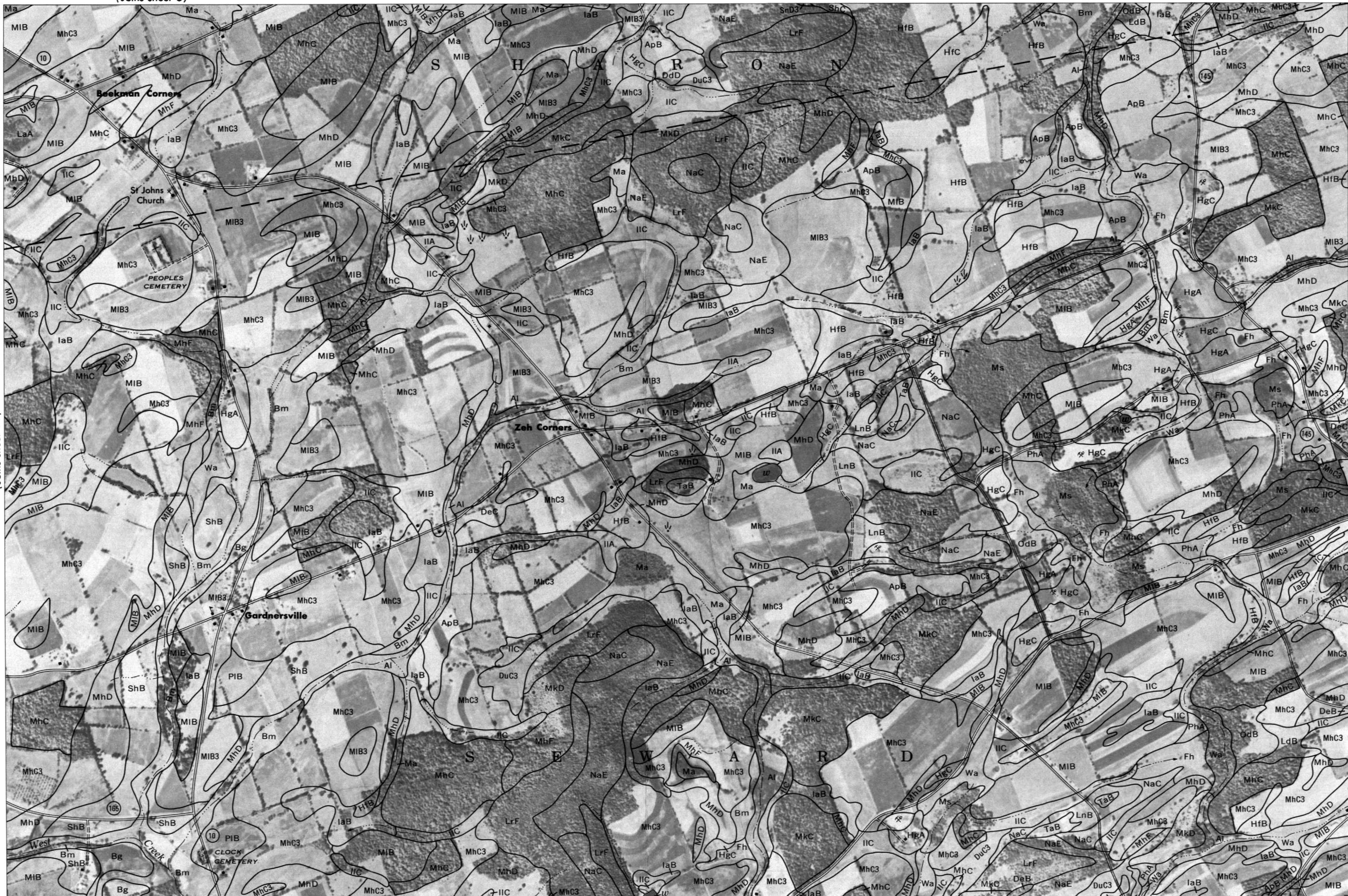
11

SCHOHARIE COUNTY, NEW YORK NO. 11

12

(Joins sheet 6)

(Joins sheet 11)



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(Joins sheet 7)

(Joins sheet 12)

(Joins sheet 14)

(Joins sheet 20)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

14

(Joins sheet 8)

N

(Joins sheet 13)

(Joins sheet 15)

(Joins sheet 21)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

(Joins sheet 9)

(Joins sheet 14)

(Joins sheet 16)

(Joins sheet 22)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet


16
N
(Joins sheet 15)
(Joins sh 17)
(Joins sheet 23)
SCHENECTADY COUNTY
E S P E R A N C E
W R I G H T
S C H O H A R I E
SnC3
DeB
DeC
IIC
NIC
DeB
BrB
Hill
Oak
VmC
BrB
NIC
DdC
BrC
LdB
HfB
HlC
LhB
FaF
DaB
DaC
Ma
VmC
NdB
HfB
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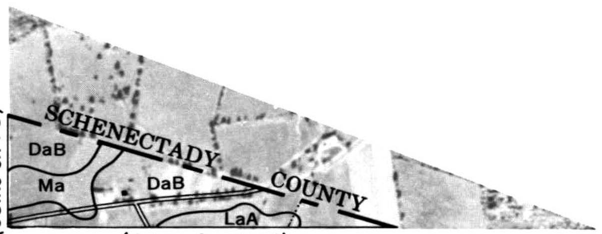
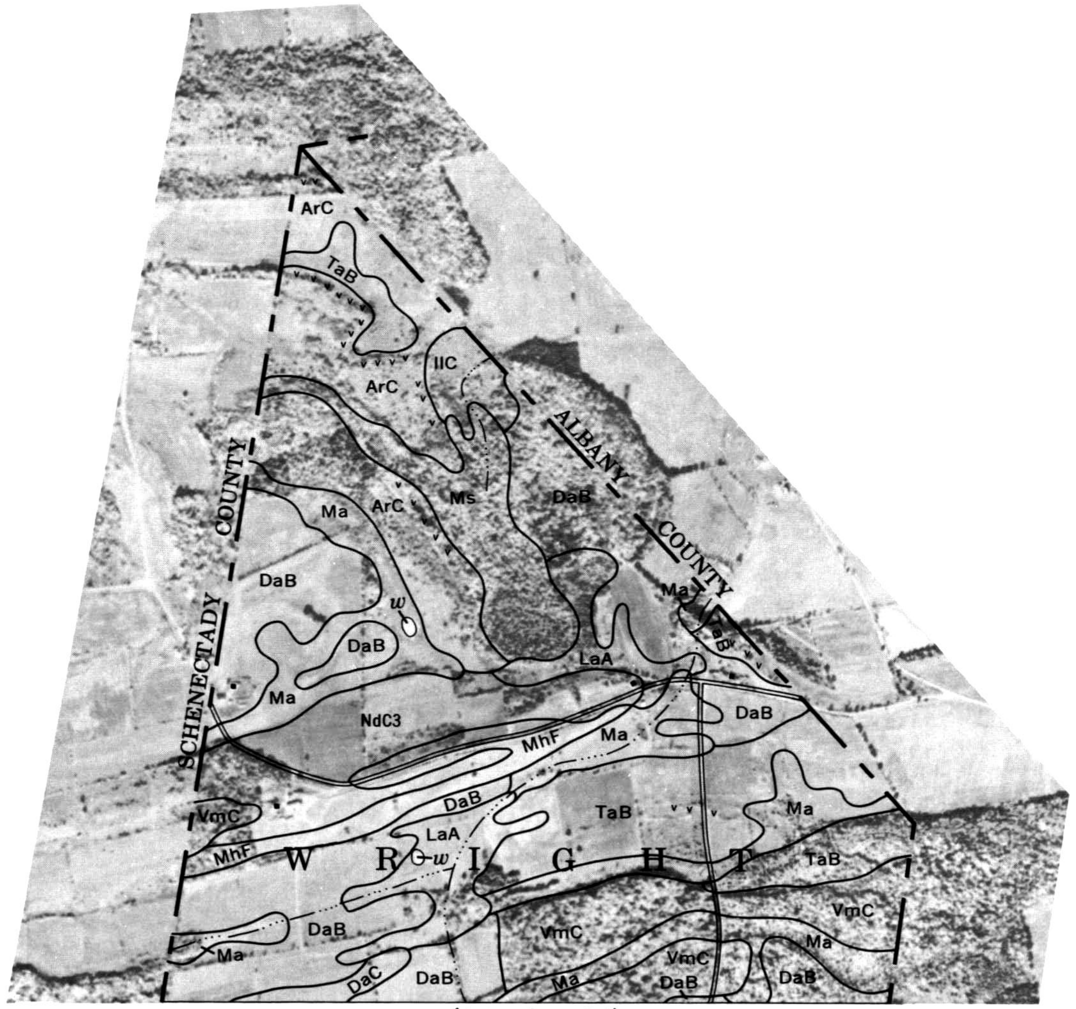
Scale 1:15 840
0 5 000 Feet

N

SCHOHARIE COUNTY, NEW YORK NO. 17





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Scale 1:15 840

0 5 000 Feet

(Joins sheet 11)

(Joins sheet 19)

(Joins sheet 25)

0 ½ 1 Mile

Scale 1:15 840

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(Joins sheet 12)

(Joins sheet 18)

(Joins sheet 20)

(Joins sheet 26)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

20

(Joins sheet 13)

(Joins sheet 19)

(Joins sheet 21)

(Joins sheet 27)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

(Joins sheet 14)

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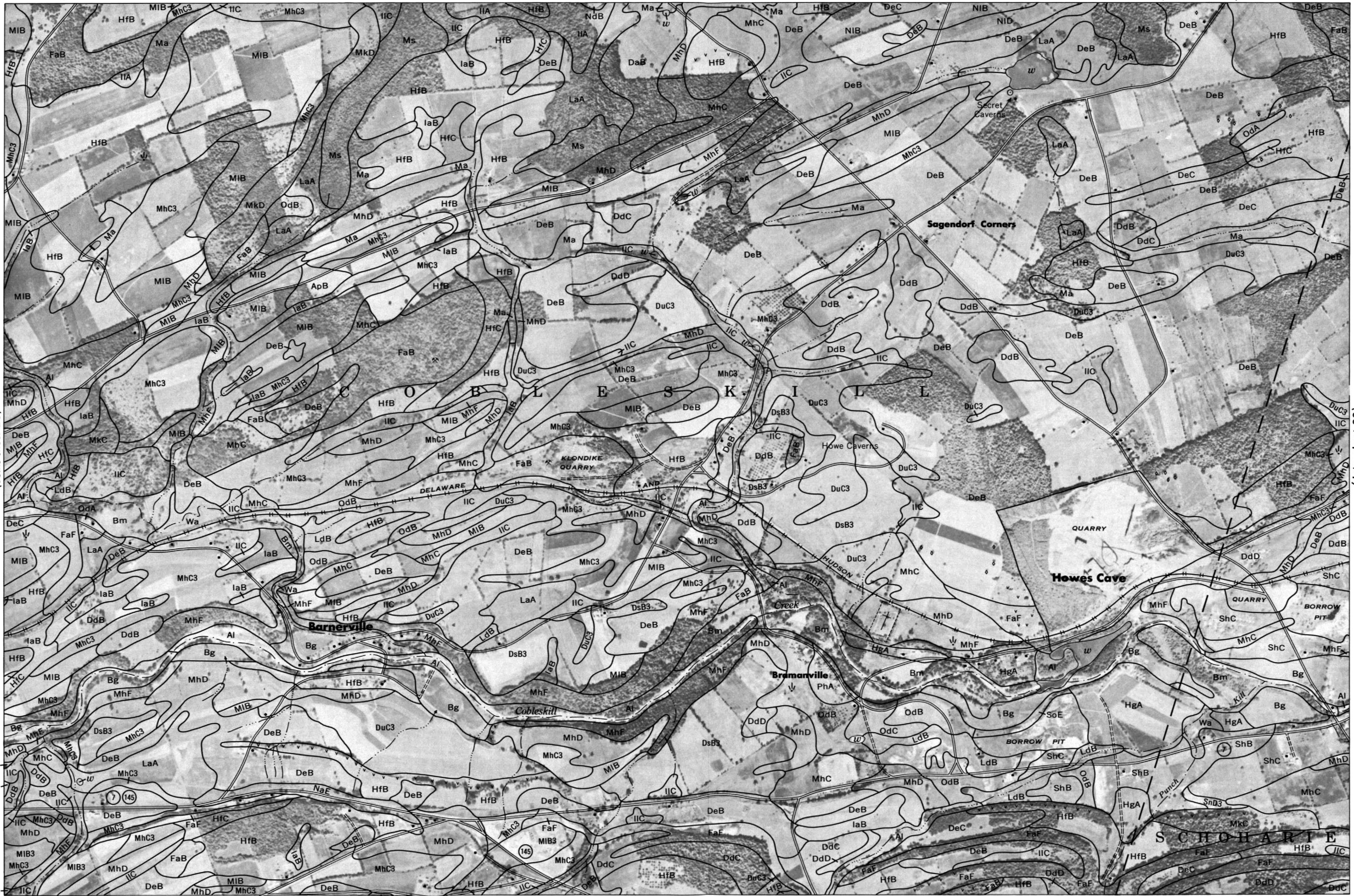
(Joins sheet 20)

SCHOHARIE COUNTY, NEW YORK NO. 21



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(Joins sheet 28)

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Scale 1:15 840

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22

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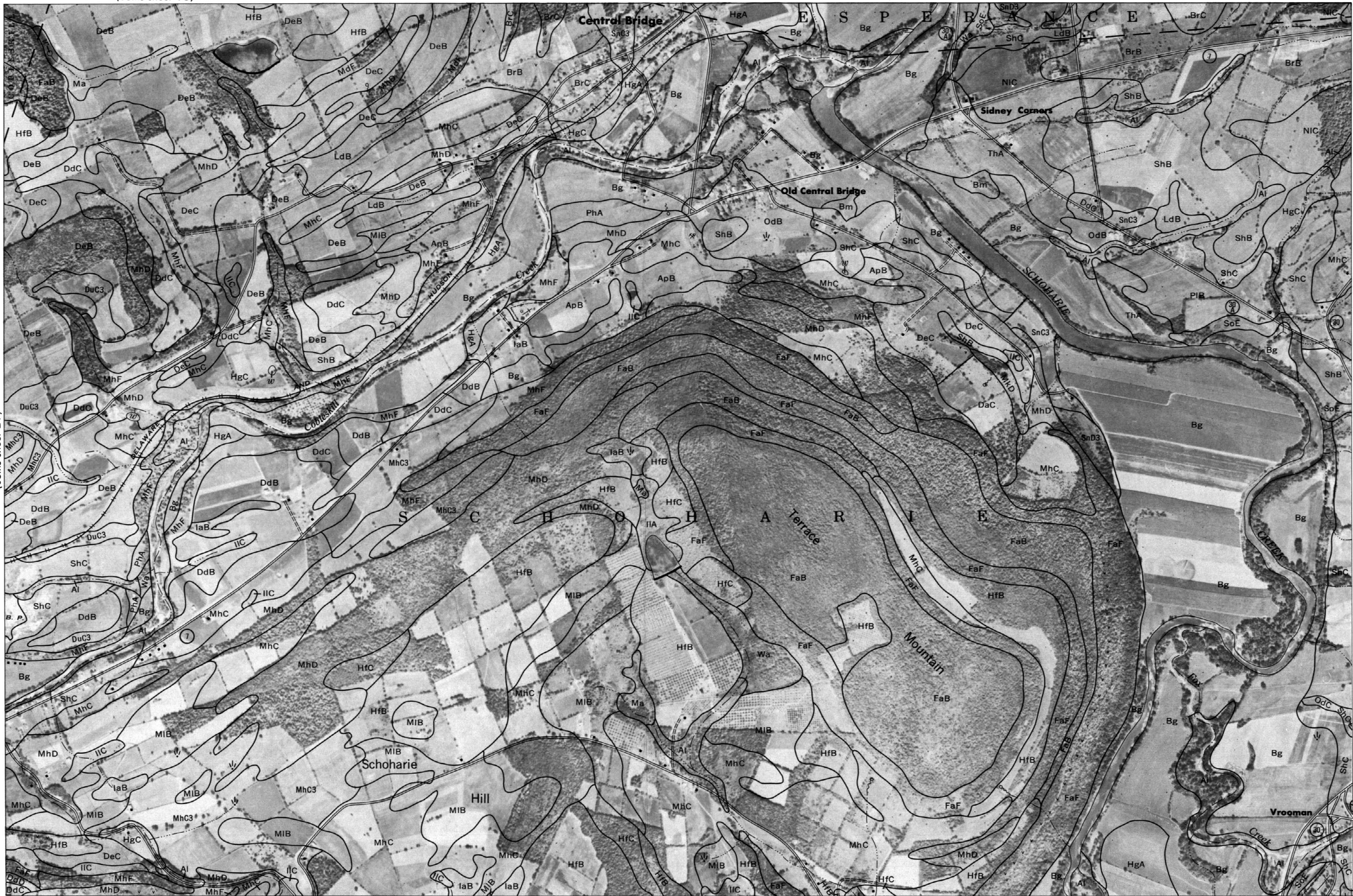

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(Joins sheet 23)

(Joins sheet 29)

0 ½ 1 Mile

Scale 1:15 840

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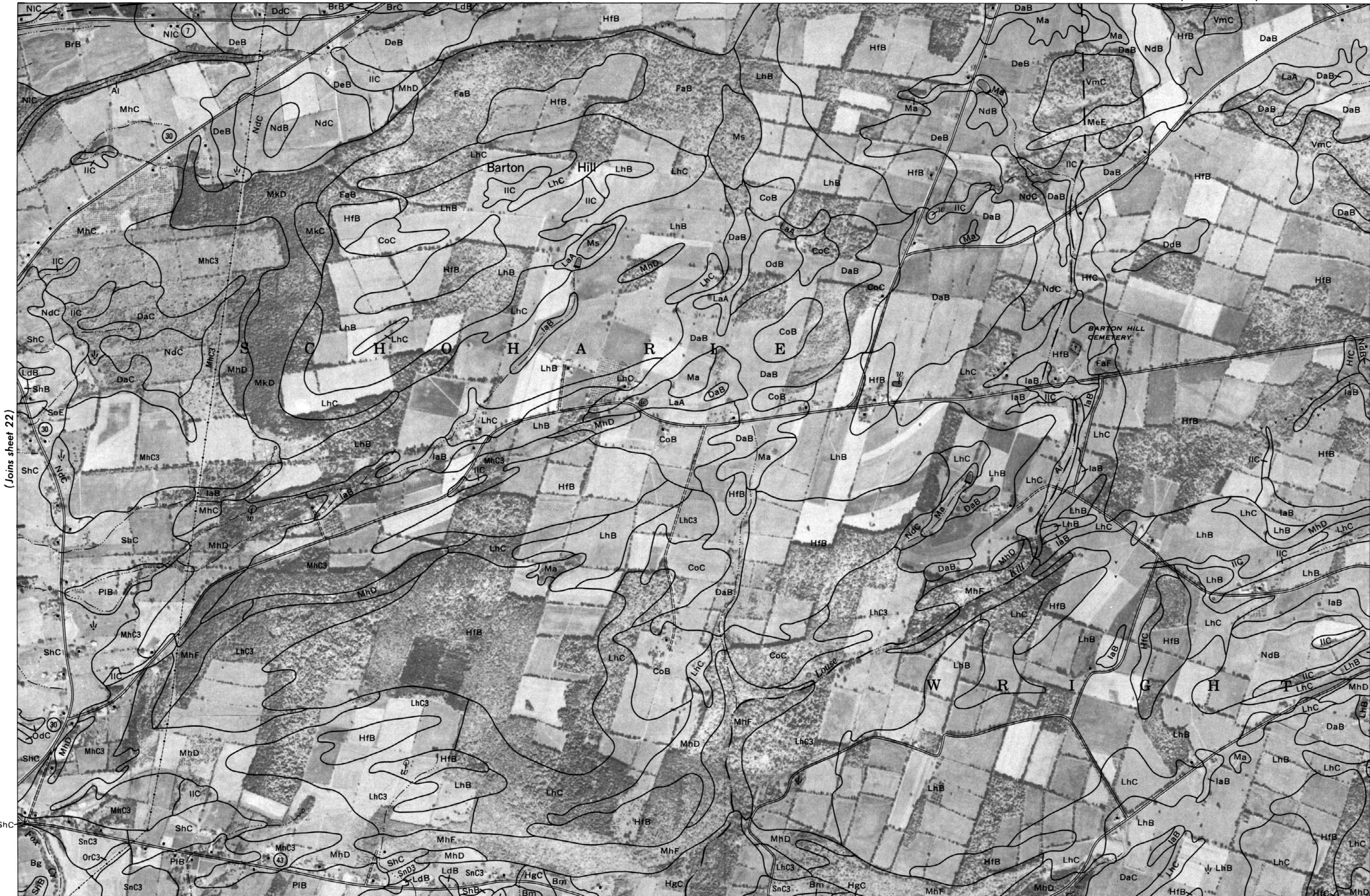
(Joins sheet 16)

23

N

SCHOHARIE COUNTY, NEW YORK NO. 23

(Joins sheet 22)



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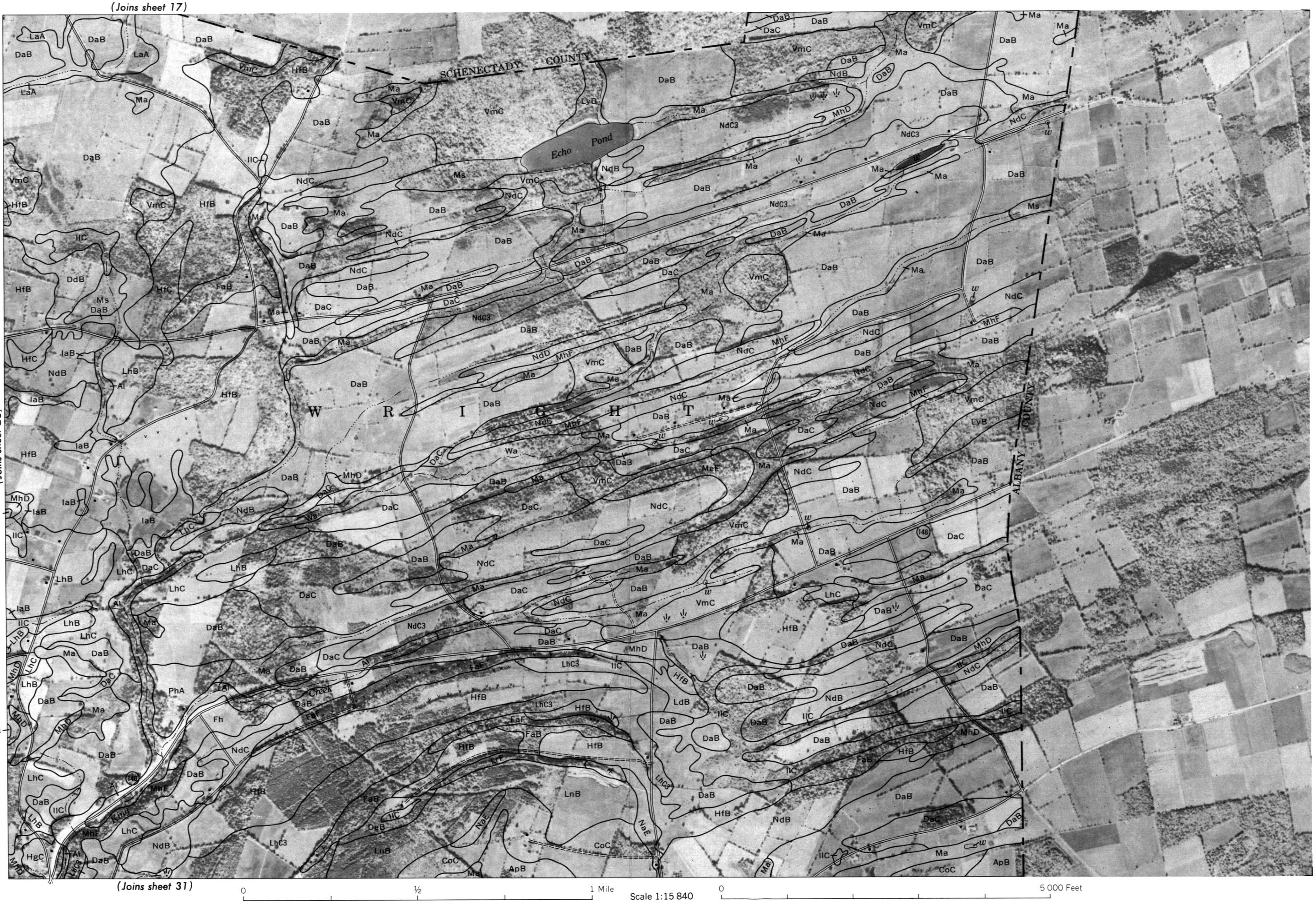
0 5 000 Feet

24


(Joins sheet 17)
N
SCHENECTADY COUNTY
Echo Pond
W R I G H T
ALBANY COUNTY
Kinderhook Creek
(Joins sheet 23)
(Joins sheet 31)
0
½
1 Mile
Scale 1:15 840
0
5 000 Feet

(Joins sheet 18)

25

N

SCHOHARIE COUNTY, NEW YORK NO. 25

(Joins sheet 26)

(Joins sheet 32)

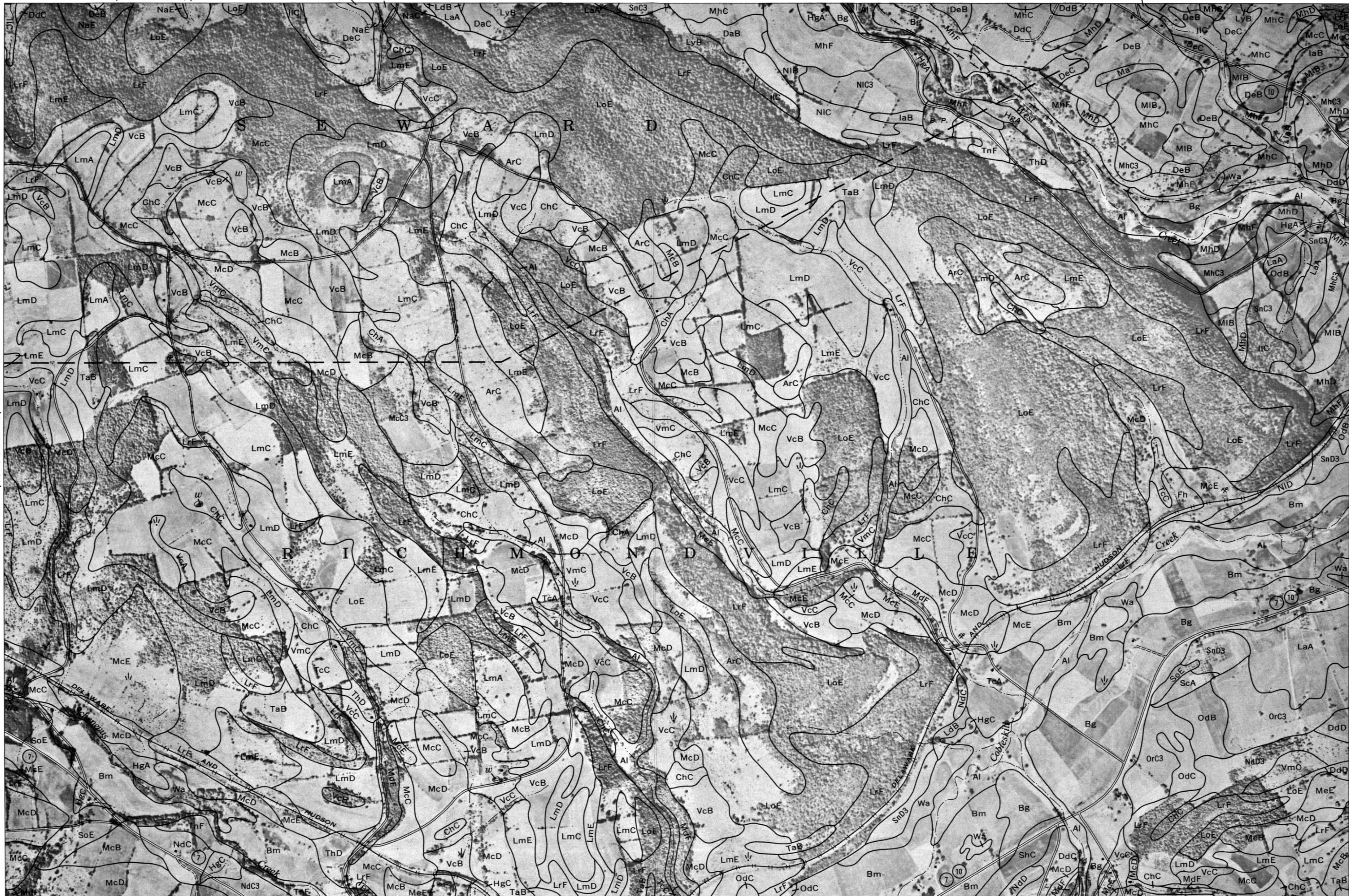
0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

26

(Joins sheet 19)



(Joins sheet 25)

(Joins sheet 27)

(Joins sheet 33)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

(Joins sheet 20)

SCHOHARIE COUNTY, NEW YORK NO. 27

(Joins sheet 26)

(Joins sheet 28)

(Joins sheet 34)

0 ½ 1 Mile Scale 1:15 840 0 5 000 Feet

(28)

(Joins sheet 21)

(Joins sheet 27)

(Joins sheet 29)

(Joins sheet 35)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

(Joins sheet 22)

(Joins sheet 28)

(Joins sheet 30)

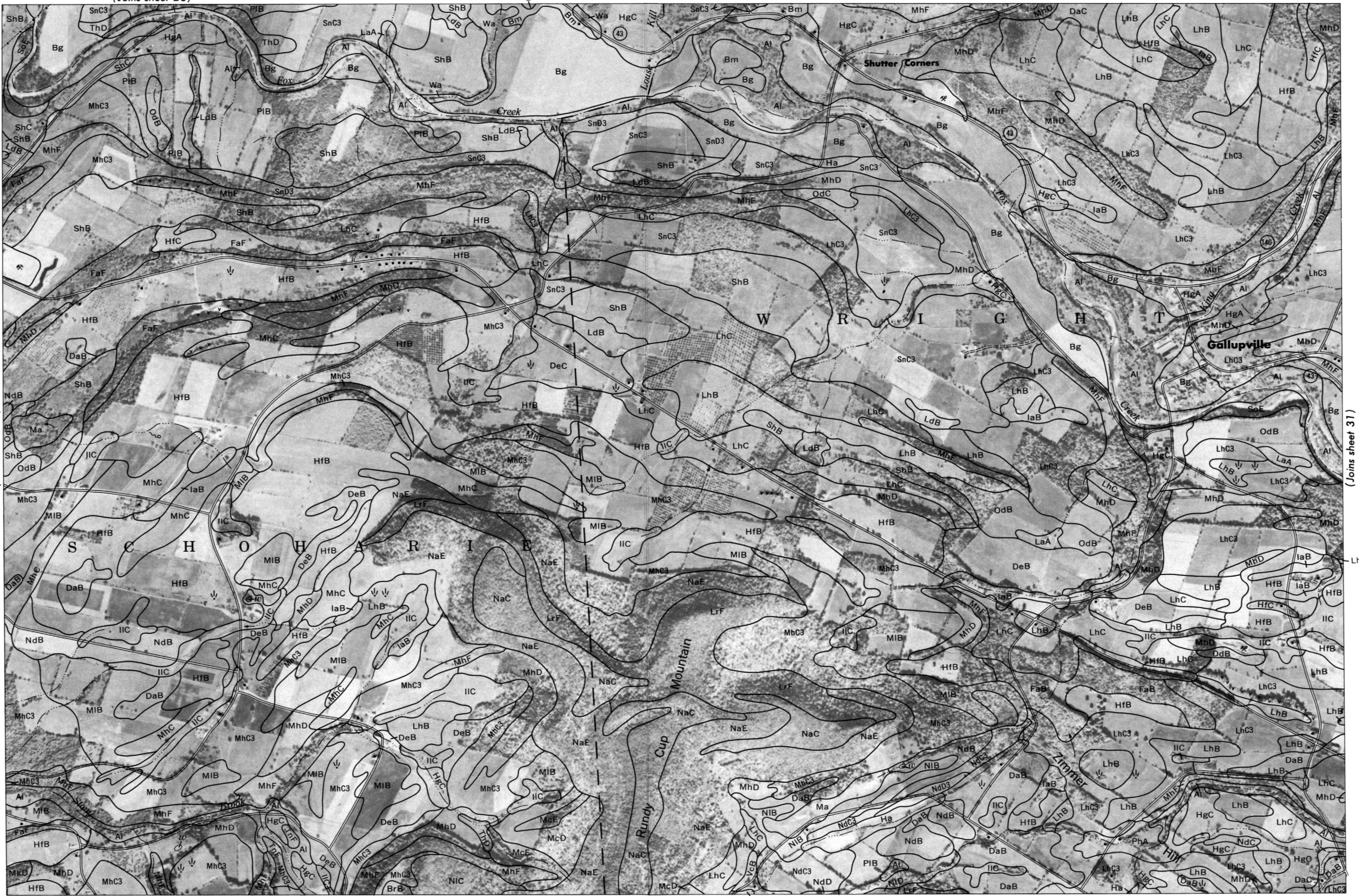
(Joins sheet 36)

0 ½ 1 Mile Scale 1:15 840 0 5 000 Feet

30

(Joins sheet 23)

(Joins sheet 29)



(Joins sheet 31)

(Joins sheet 37)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

(Joins sheet 24)

(Joins sheet 30)

(Joins sheet 38)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

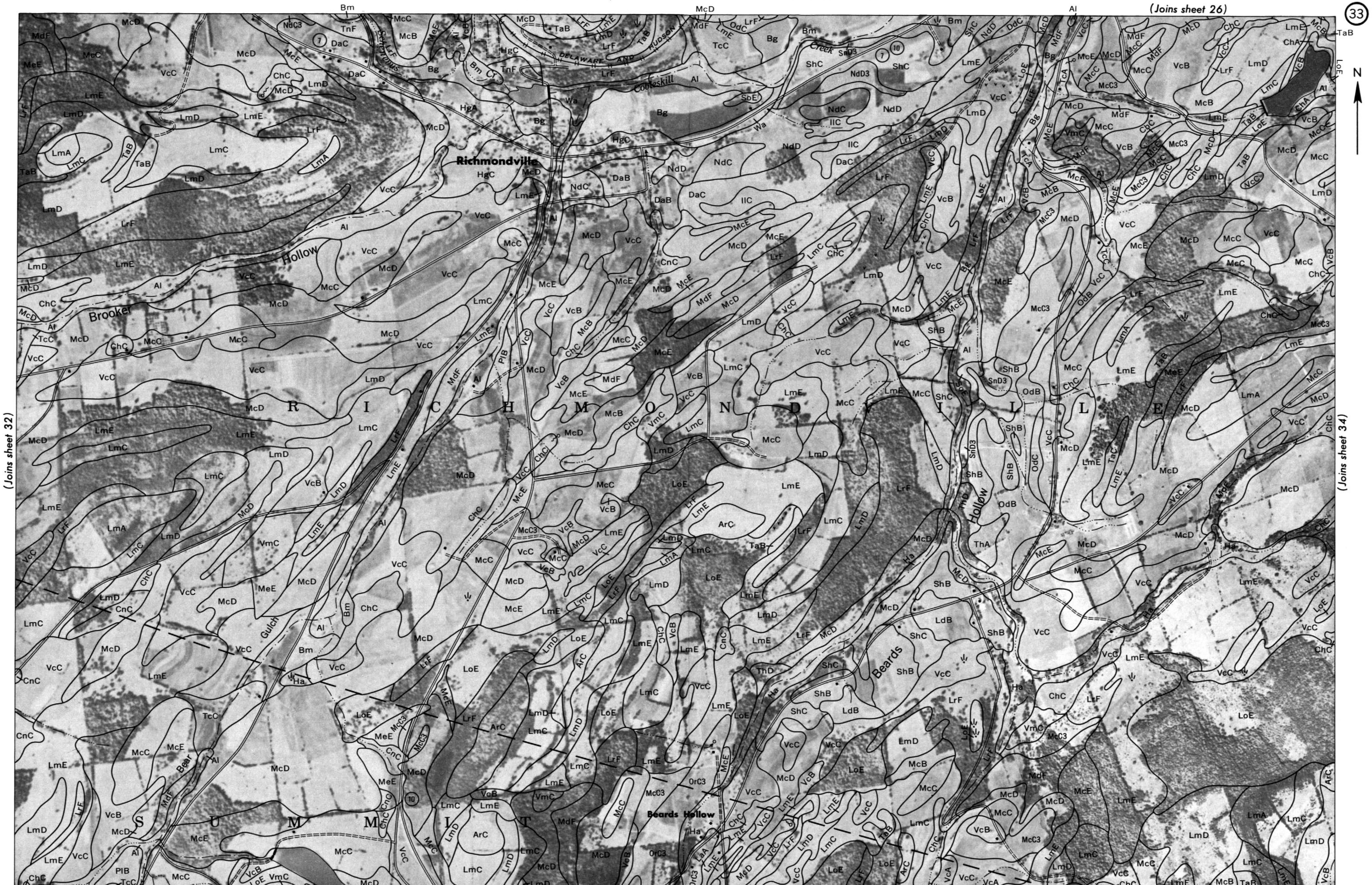
(Joins sheet 25)

(Joins sheet 33)

(Joins sheet 39)

0 ½ 1 Mile
Scale 1:15 840
0 5 000 Feet

SCHOHARIE COUNTY, NEW YORK — SHEET NUMBER 33



0 ½ 1 Mile
Scale 1:15 840
0 5 000 Feet

SCHOHARIE COUNTY, NEW YORK NO. 33

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

SCHOHARIE COUNTY, NEW YORK — SHEET NUMBER 34

(Joins sheet 27)

(Joins sheet 33)

(Joins sheet 35)

(Joins sheet 41)

0 ½ 1 Mile

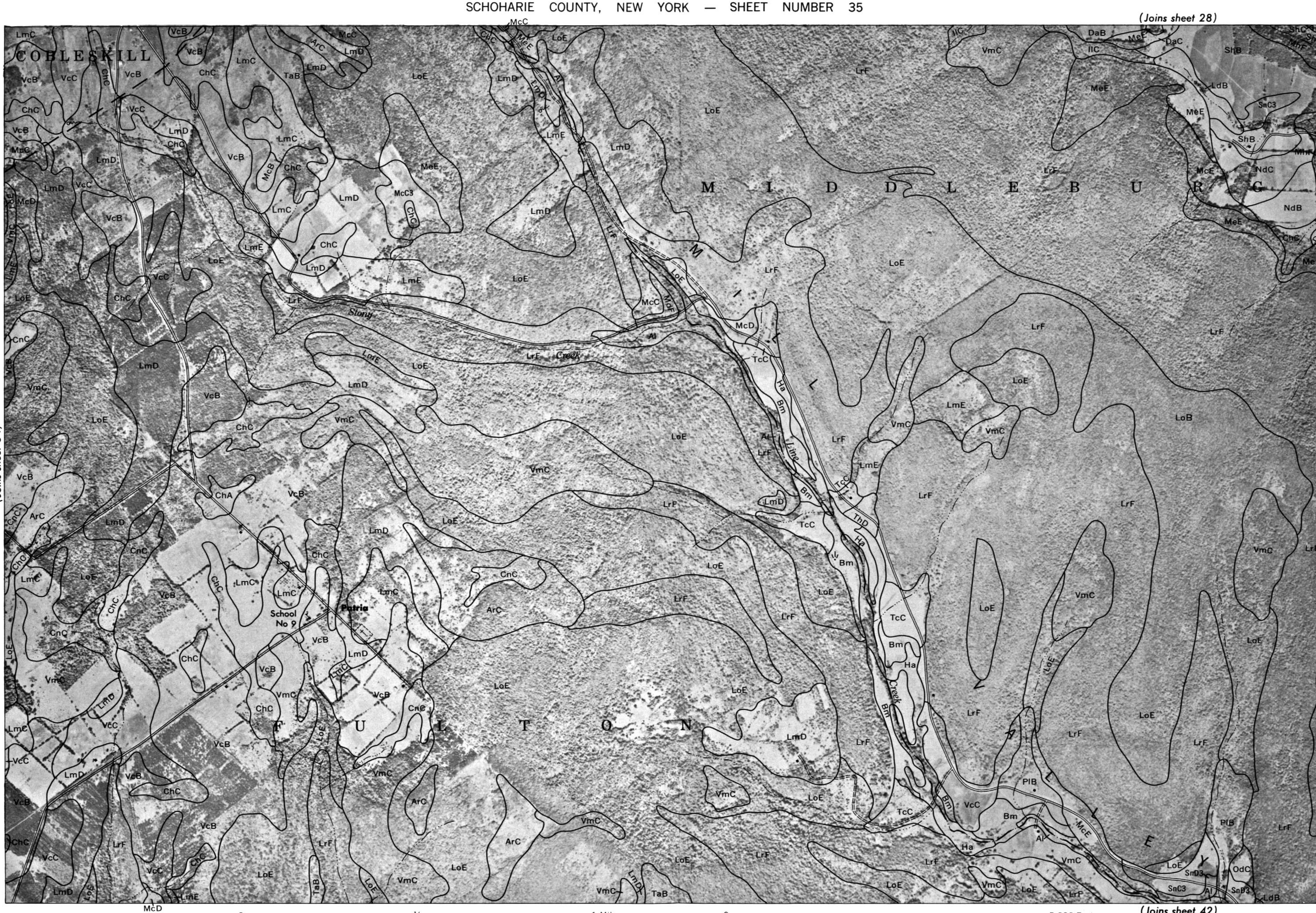
Scale 1:15 840

0 5 000 Feet

SCHOHARIE COUNTY, NEW YORK NO. 34

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

35



0 ½ 1 Mile Scale 1:15 840 0 5 000 Feet

SCHOHARIE COUNTY, NEW YORK NO. 35

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

SCHOHARIE COUNTY, NEW YORK — SHEET NUMBER 36

(Joins sheet 29)

(Joins sheet 35)

(Joins sheet 37)

(Joins sheet 43)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

SCHOHARIE COUNTY, NEW YORK NO. 36

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

(Joins sheet 30)

(Joins sheet 36)

(Joins sheet 38)

(Joins sheet 44)

0 ½ 1 Mile 0 5 000 Feet

Scale 1:15 840

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

(Joins sheet 31)

N

(Joins sheet 37)

(Joins inset)

(Joins lower left)

(Joins sheet 44)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

SCHOHARIE COUNTY, NEW YORK NO. 38

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

(Joins sheet 32)

39

(Sheet 45) | (Joins sheet 46)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

SCHOHARIE COUNTY, NEW YORK NO. 39

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

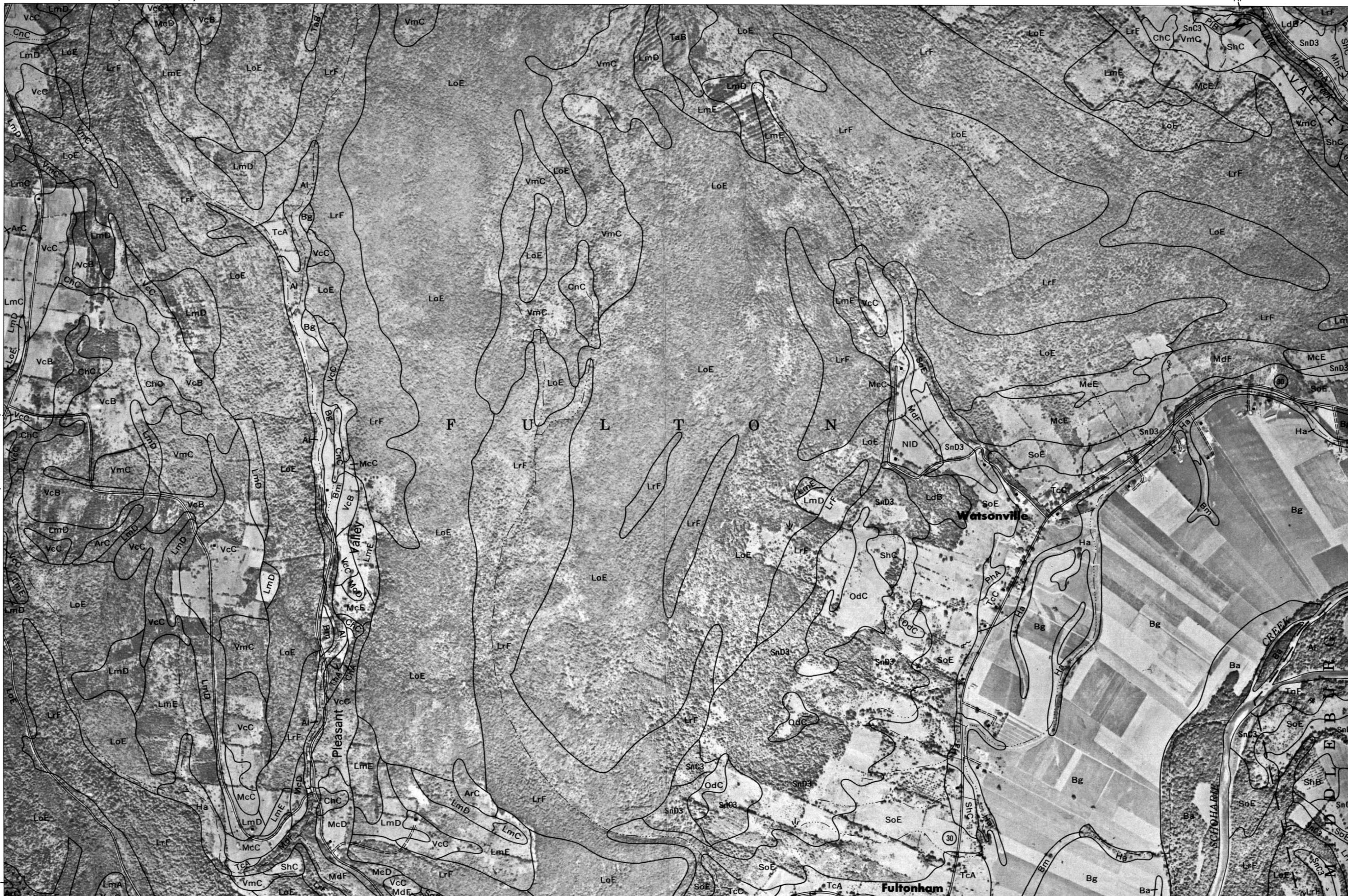
SCHOHARIE COUNTY, NEW YORK NO. 40

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

SCHOHARIE COUNTY, NEW YORK NO. 41

42



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Scale 1:15 840

0 5 000 Feet

SCHOHARIE COUNTY, NEW YORK NO. 42

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

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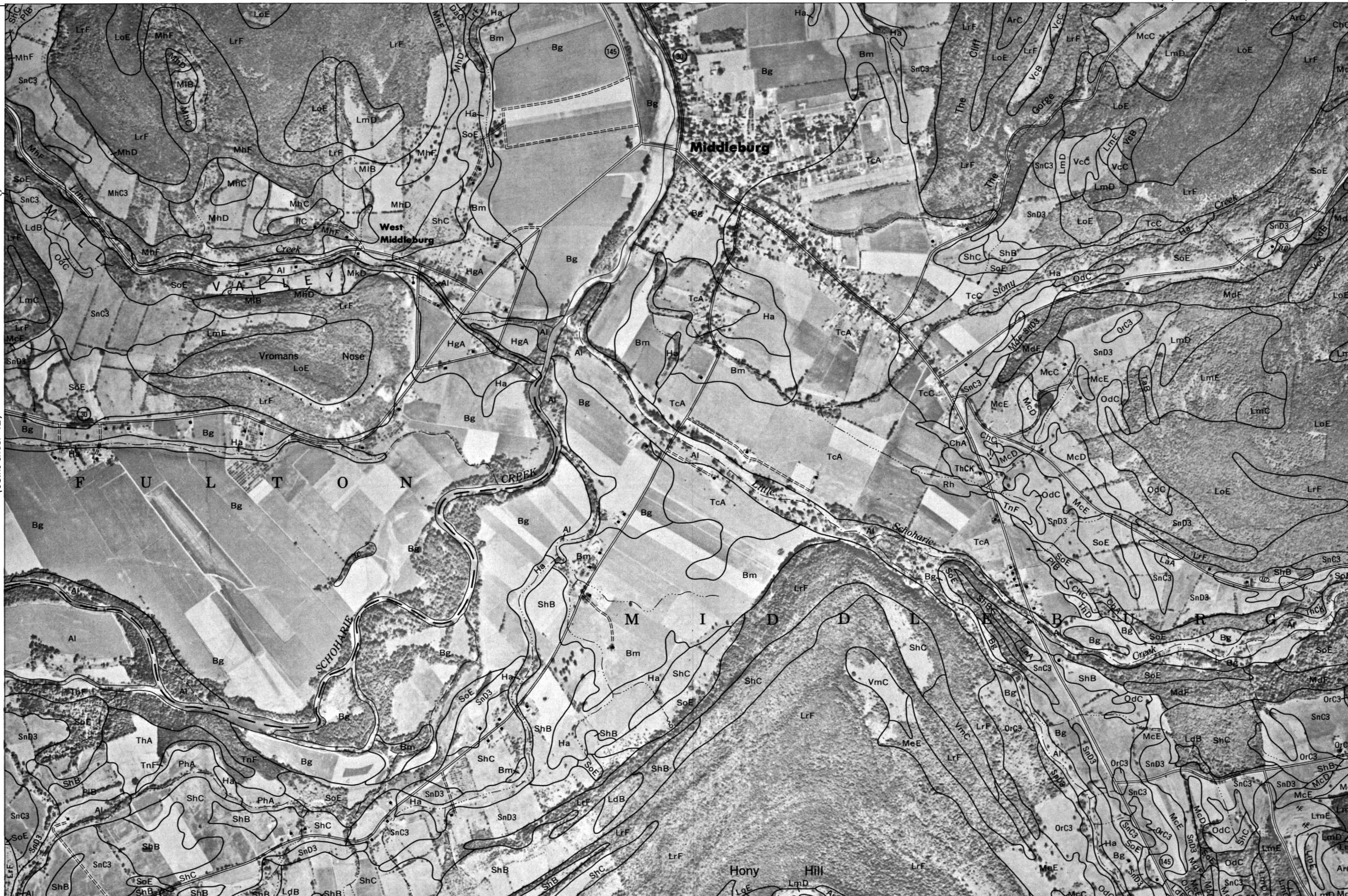

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(Joins sheet 44)

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0 ½ 1 Mile

Scale 1:15 840

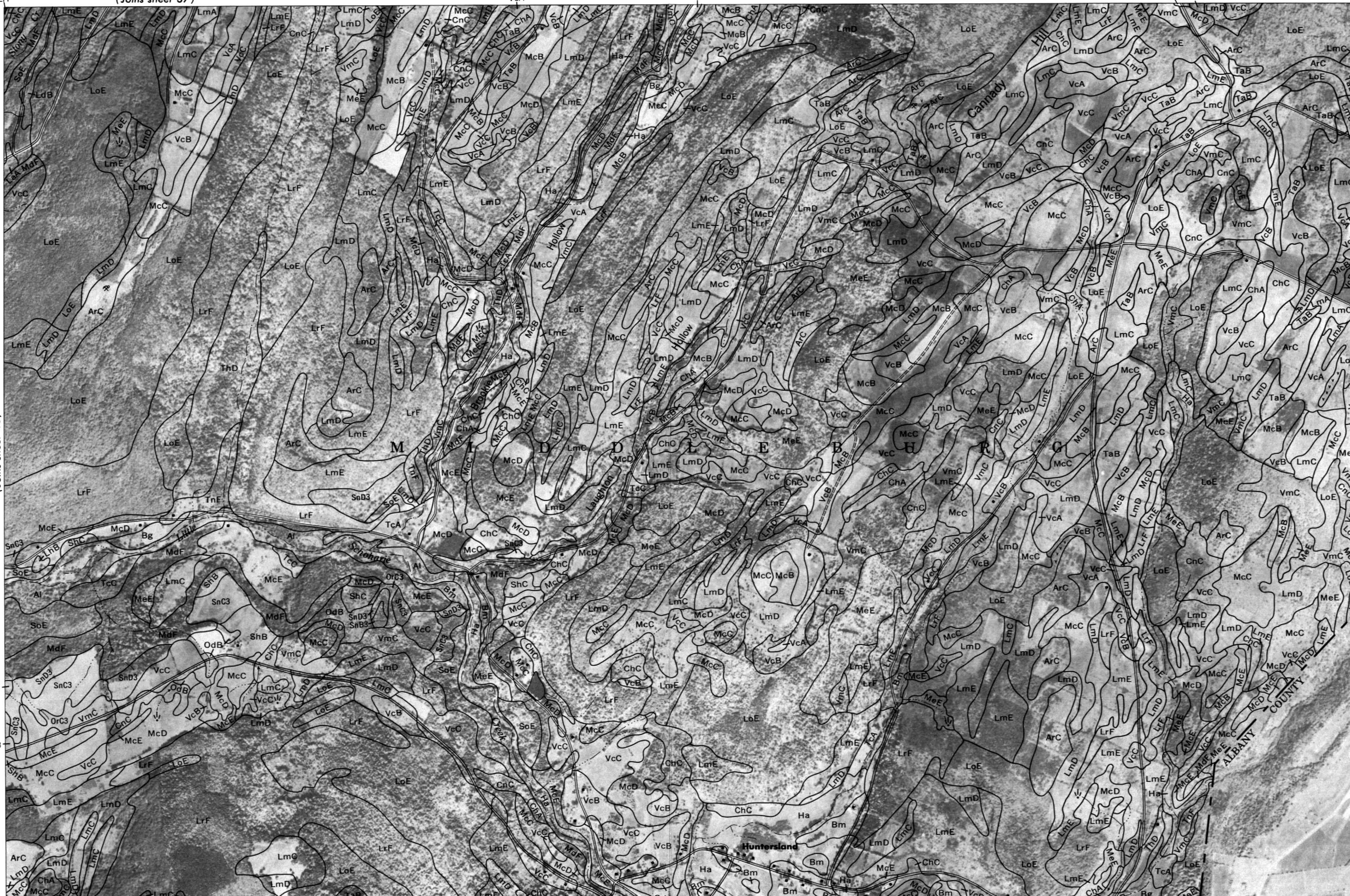
0 5 000 Feet

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

44

(Joins sheet 37)

(Joins sheet 43)



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(Joins sheet 51)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

SCHOHARIE COUNTY, NEW YORK NO. 44

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

45

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

SCHOHARIE COUNTY, NEW YORK NO. 45

0 ½ 1 Mile Scale 1:15 840 0 5 000 Feet

46

(Joins sheet 39)

(Joins sheet 45)

(Joins sheet 47)

(Joins sheet 53)

0 ½ 1 Mile Scale 1:15 840 0 5 000 Feet

SCHOHARIE COUNTY, NEW YORK NO. 46

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

47

(Joins sheet 40)

(Joins sheet 46)

(Joins sheet 48)

(Joins sheet 54)

N

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

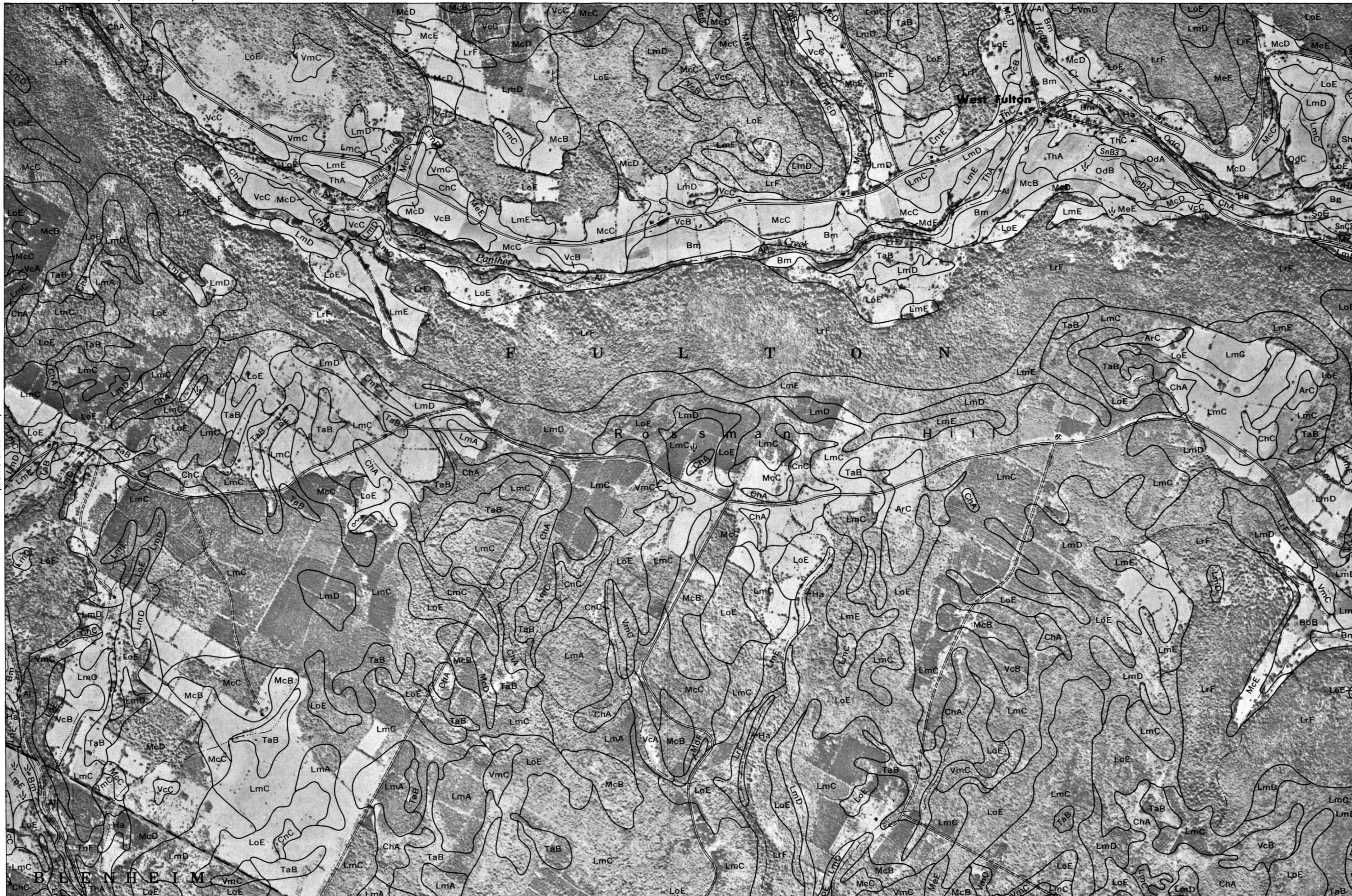
SCHOHARIE COUNTY, NEW YORK NO. 47

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

(Joins sheet 41)

N

(Joins sheet 47)



(Joins sheet 49)

(Joins sheet 55)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

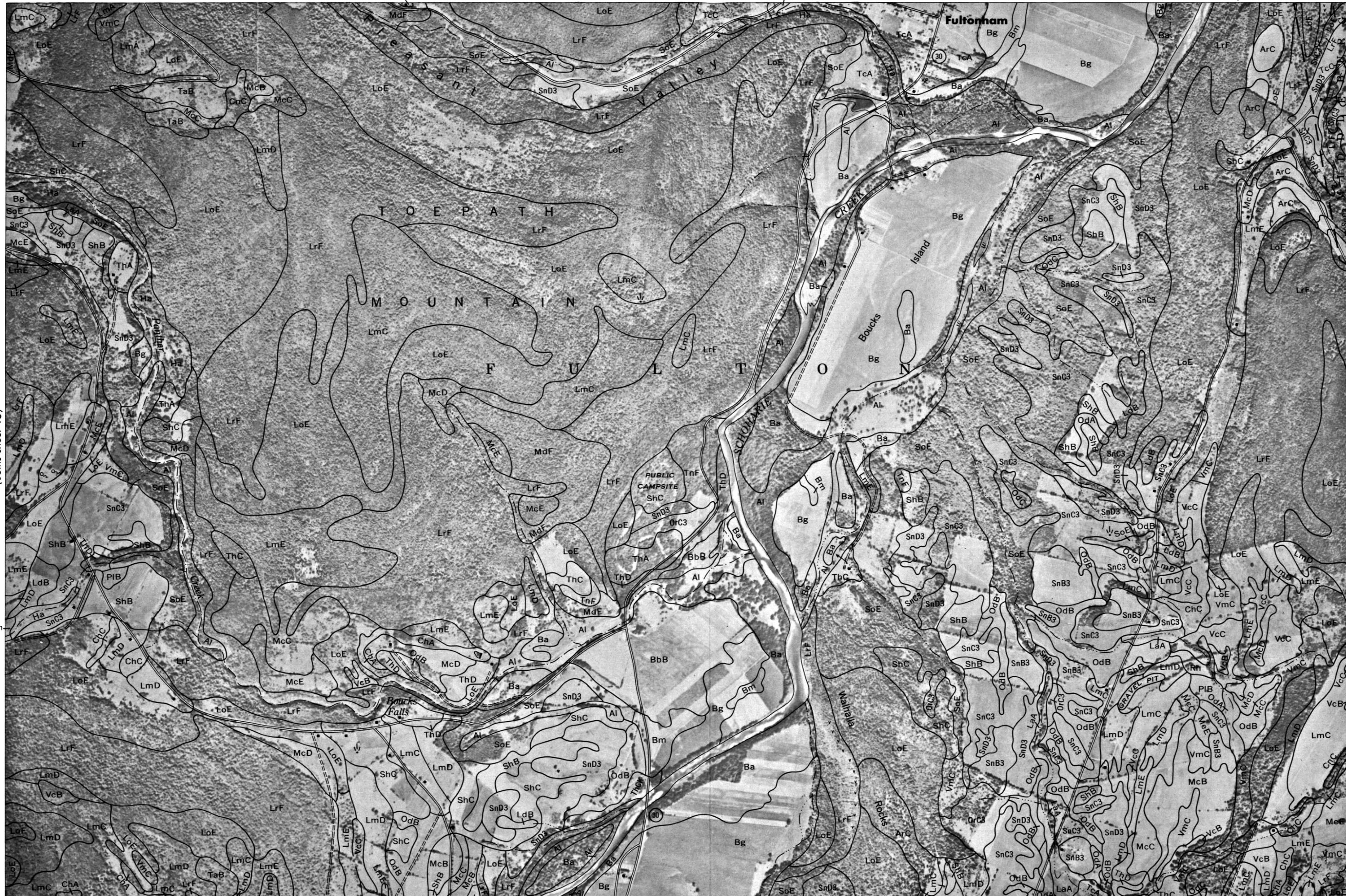
SCHOHARIE COUNTY, NEW YORK NO. 48

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

(49)

(Joins sheet 42)

(Joins sheet 48)



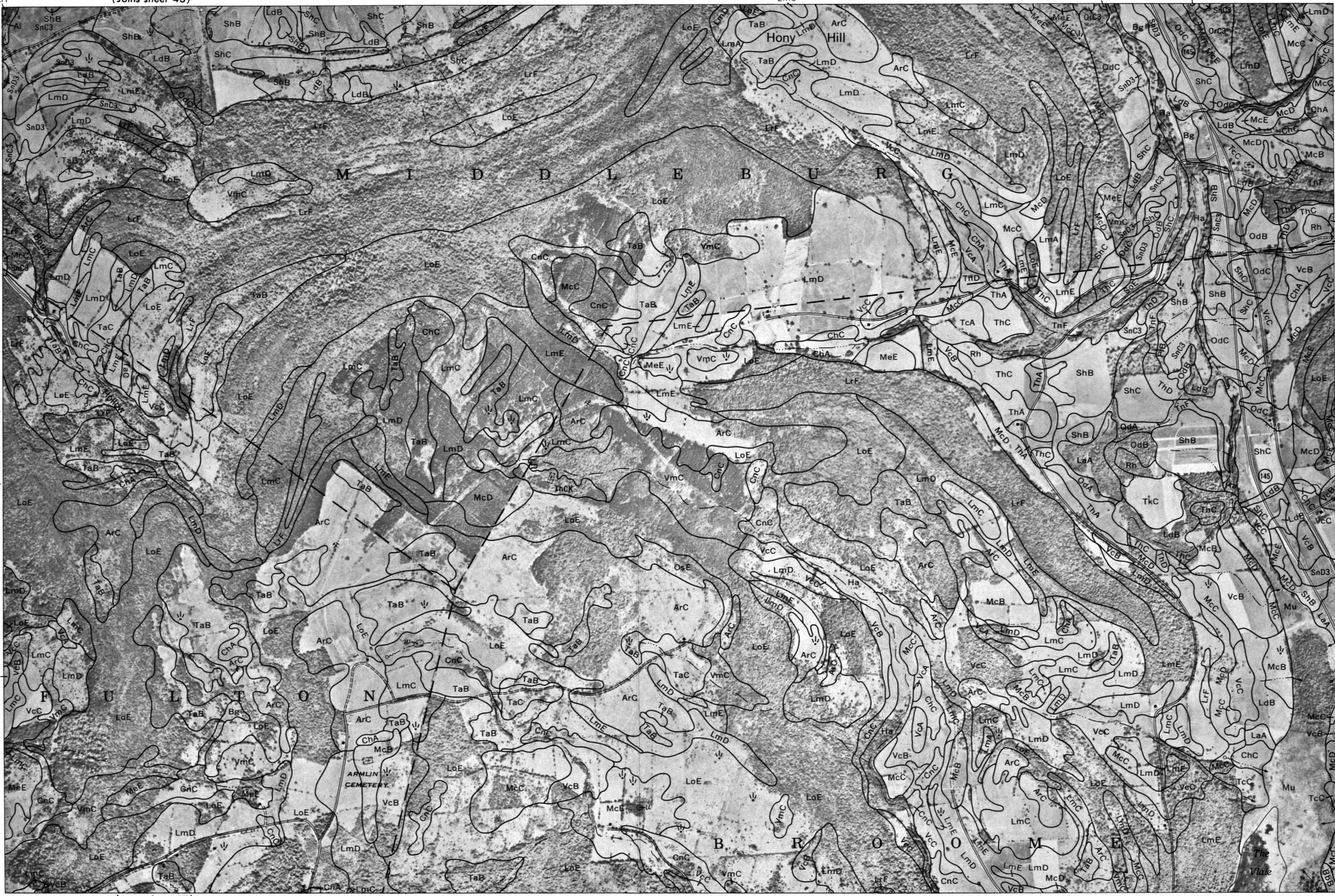
(Joins sheet 50)

(Joins sheet 56)

0 ½ 1 Mile   Scale 1:15 840   0 5 000 Feet

(Joins sheet 43)

(Joins sheet 49)



(Joins sheet 51)

(Joins sheet 57)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

SCHOHARIE COUNTY, NEW YORK NO. 51

N

0 ½ 1 Mile Scale 1:15 840 0 5 000 Feet

53

(Joins sheet 46)

(Joins sheet 52)

(Joins sheet 54)

(Joins sheet 59)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

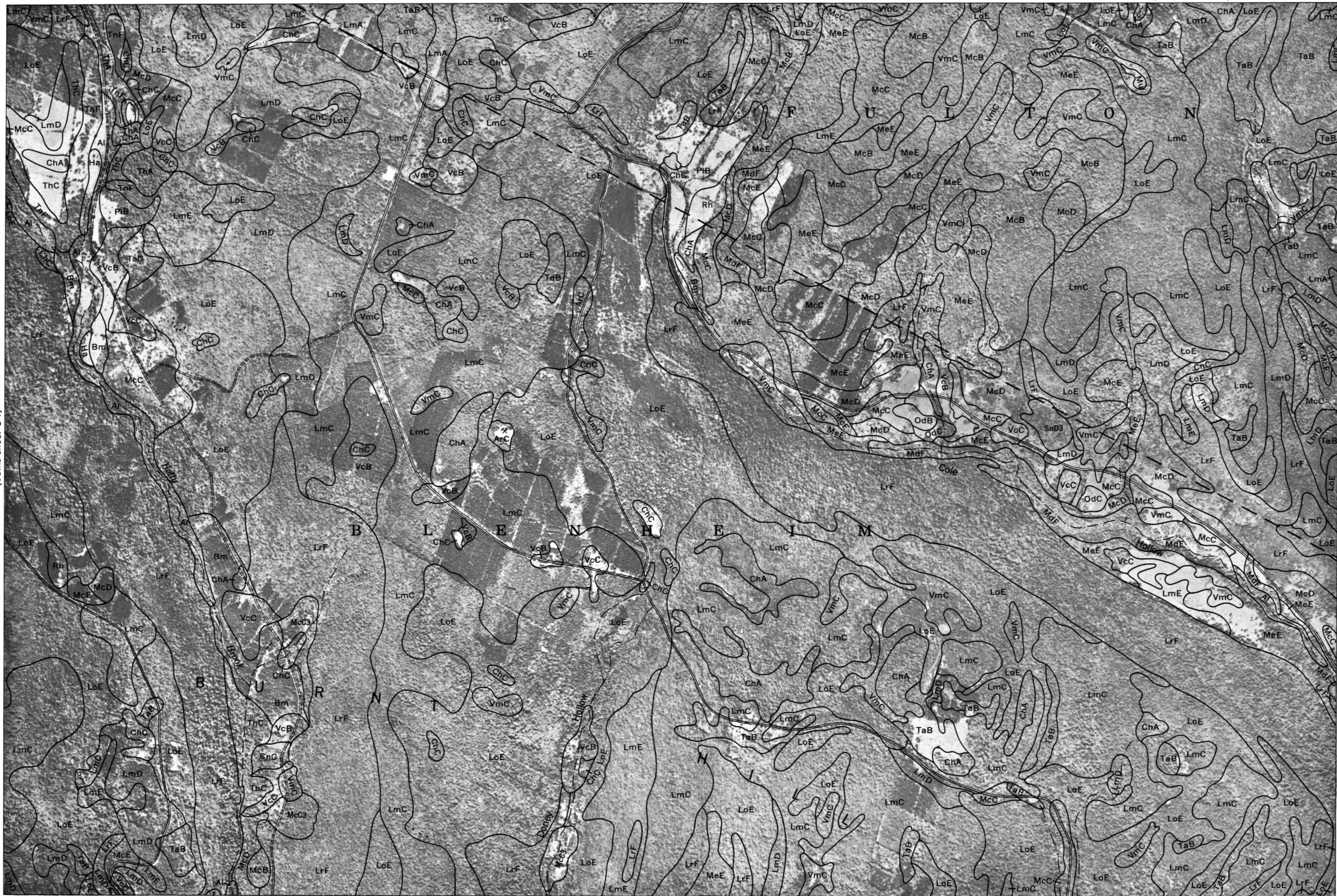

54
N
(Joins sheet 47)
(Joins sheet 53)
(Joins sheet 55)
(Joins sheet 60)
S U M M I T
J E F F E R S O N
B L E N H E I M
B U R N T H I L L
Eminence
East Jefferson
West Kill
0 ½ 1 Mile
Scale 1:15 840
0 5 000 Feet

(Joins sheet 48)

55

SCHOHARIE COUNTY, NEW YORK NO. 55

(Joins sheet 54)



(Joins sheet 56)

(Joins sheet 61)

0 ½ 1 Mile

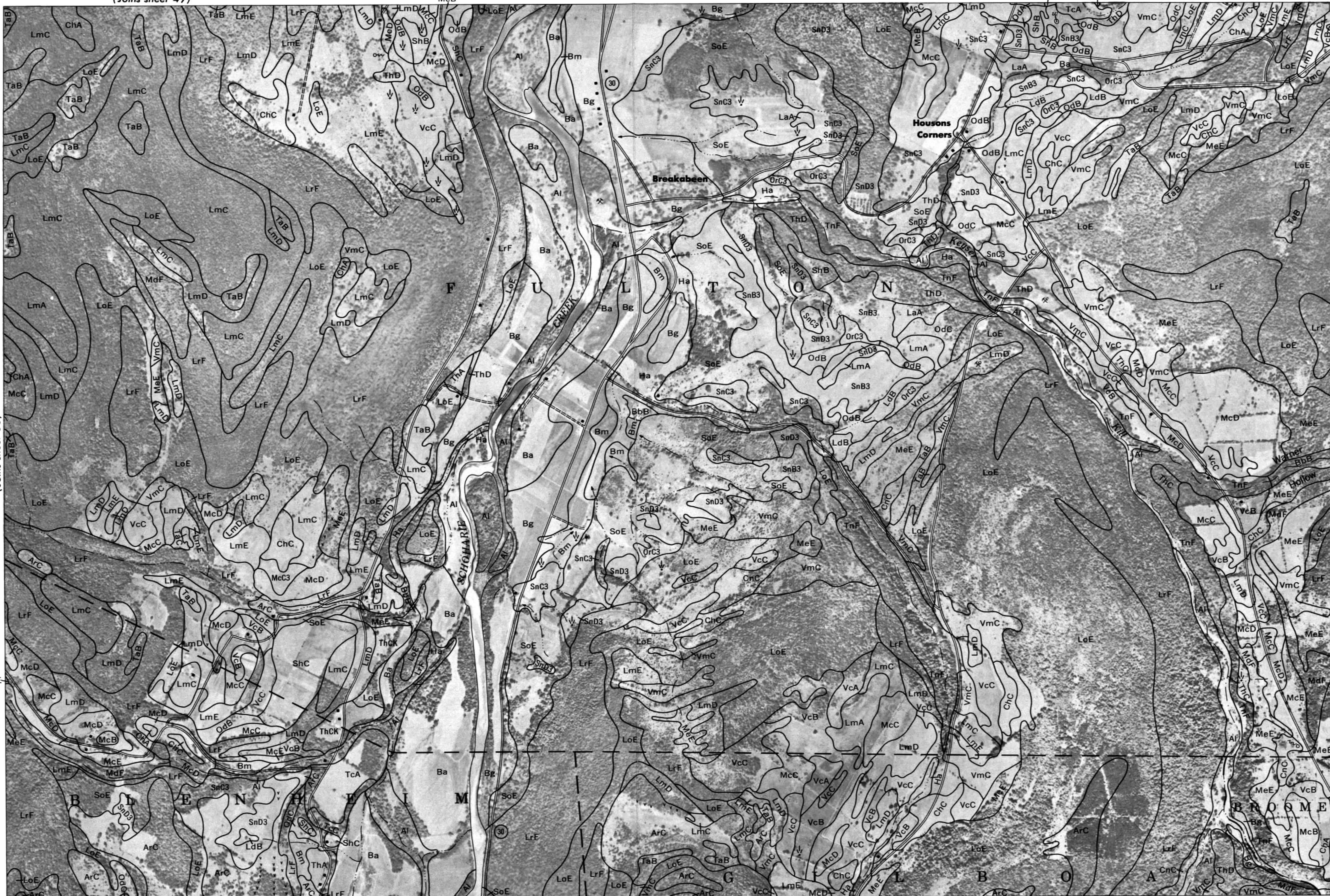
Scale 1:15 840

0 5 000 Feet

(Joins sheet 49)

N

(Joins sheet 55)



(Joins sheet 57)

(Joins sheet 62)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

57

SCHOHARIE COUNTY, NEW YORK NO. 57

(Joins sheet 50)

(Joins sheet 56)

(Joins sheet 58)

(Joins sheet 63)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

0 ½ 1 Mile
Scale 1:15 840
0 5 000 Feet

SCHOHARIE COUNTY, NEW YORK NO. 58

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

0 ½ 1 Mile
Scale 1:15 840
0 5 000 Feet

60

(Joins sheet 54)

(Joins sheet 59)

(Joins sheet 61)

(Joins sheet 66)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

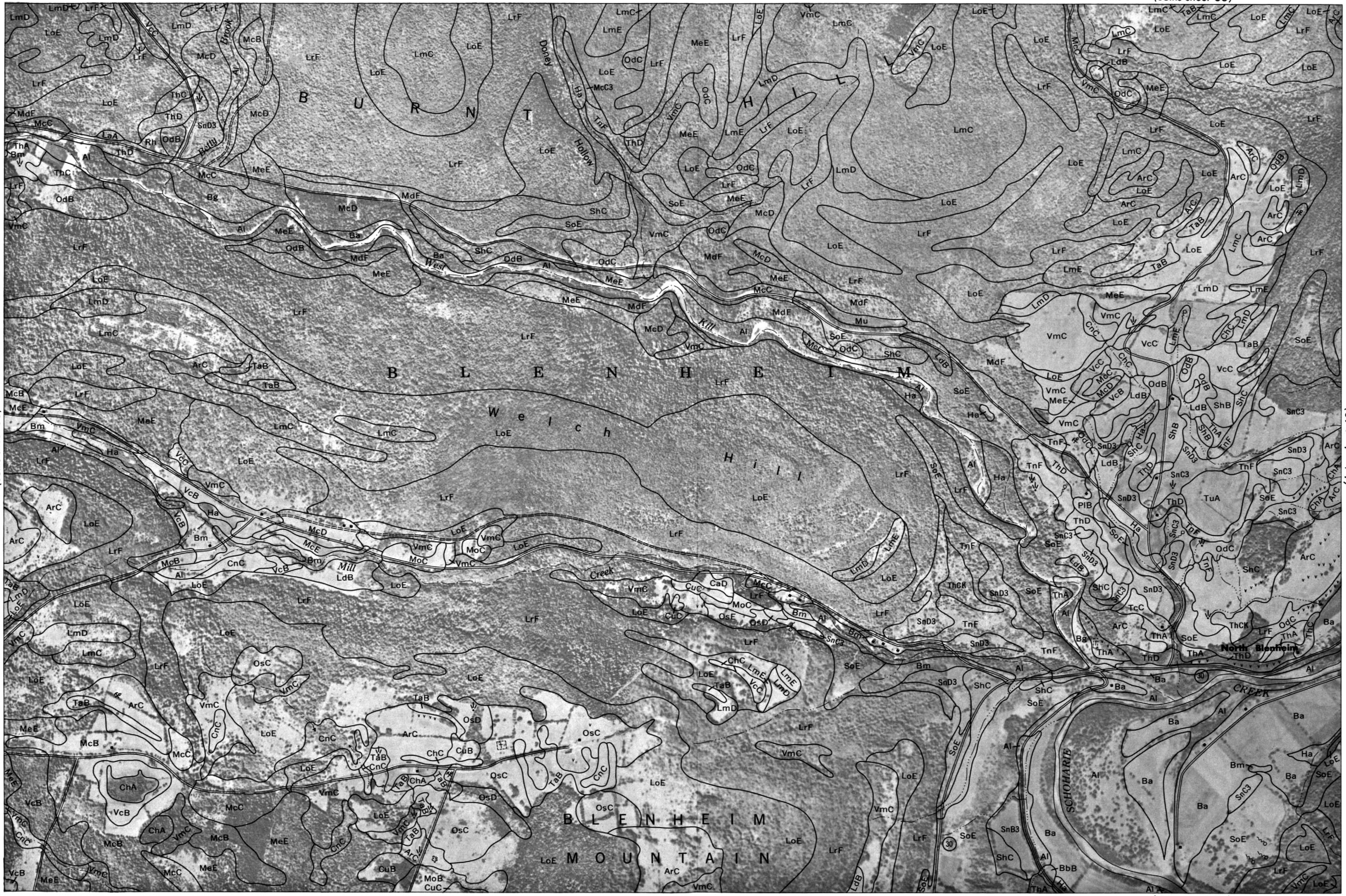
SCHOHARIE COUNTY, NEW YORK NO. 60

(Joins sheet 55)

61

SCHOHARIE COUNTY, NEW YORK NO. 61

(Joins sheet 60)



(Joins sheet 62)

(Joins sheet 67)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

N

(Joins sheet 56)

(Joins sheet 61)

(Joins sheet 63)

(Joins sheet 68)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

SCHOHARIE COUNTY, NEW YORK NO. 62

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

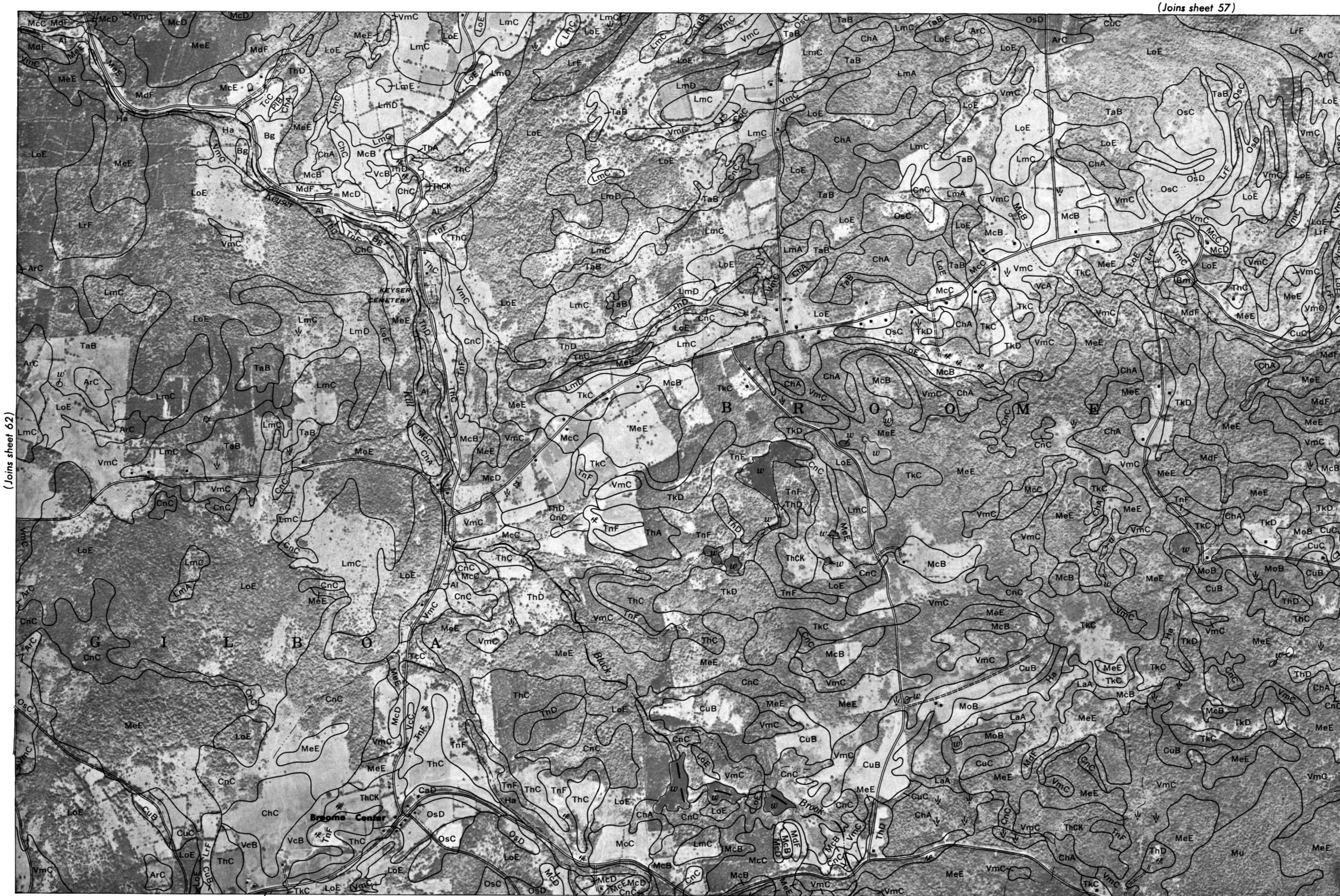
63

(Joins sheet 57)

(Joins sheet 62)

(Joins sheet 64)

SCHOHARIE COUNTY, NEW YORK NO. 63



0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

(Joins sheet 69)

64

N

(Joins sheet 58)

(Joins sheet 63)

(Joins sheet 70)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

SCHOHARIE COUNTY, NEW YORK NO. 64

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

SCHOHARIE COUNTY, NEW YORK NO. 65

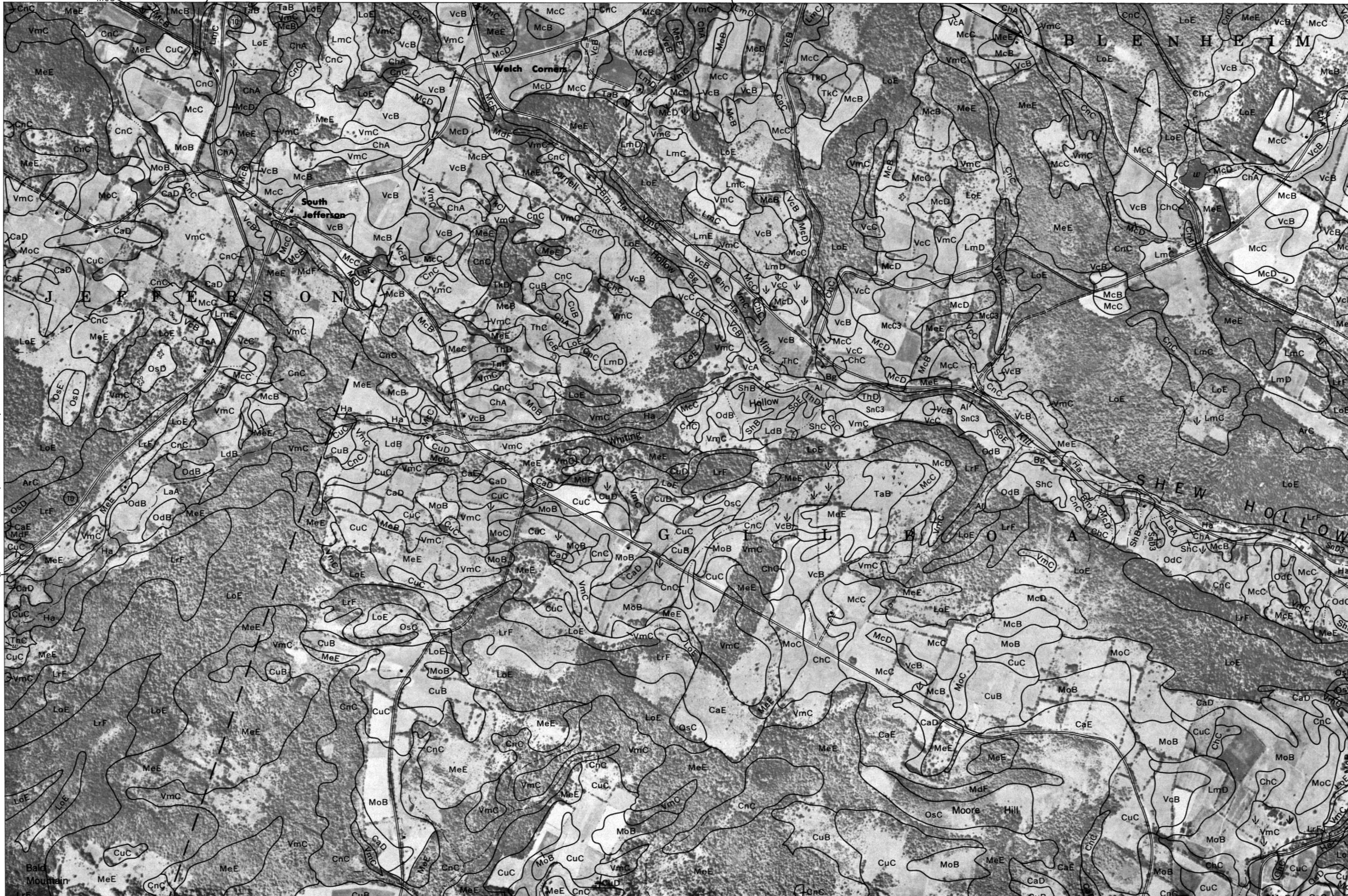
0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

66

(Joins sheet 60)



(Joins sheet 65)

(Joins sheet 67)

(Joins sheet 71)

0 ½ 1 Mile

Scale 1:15 840

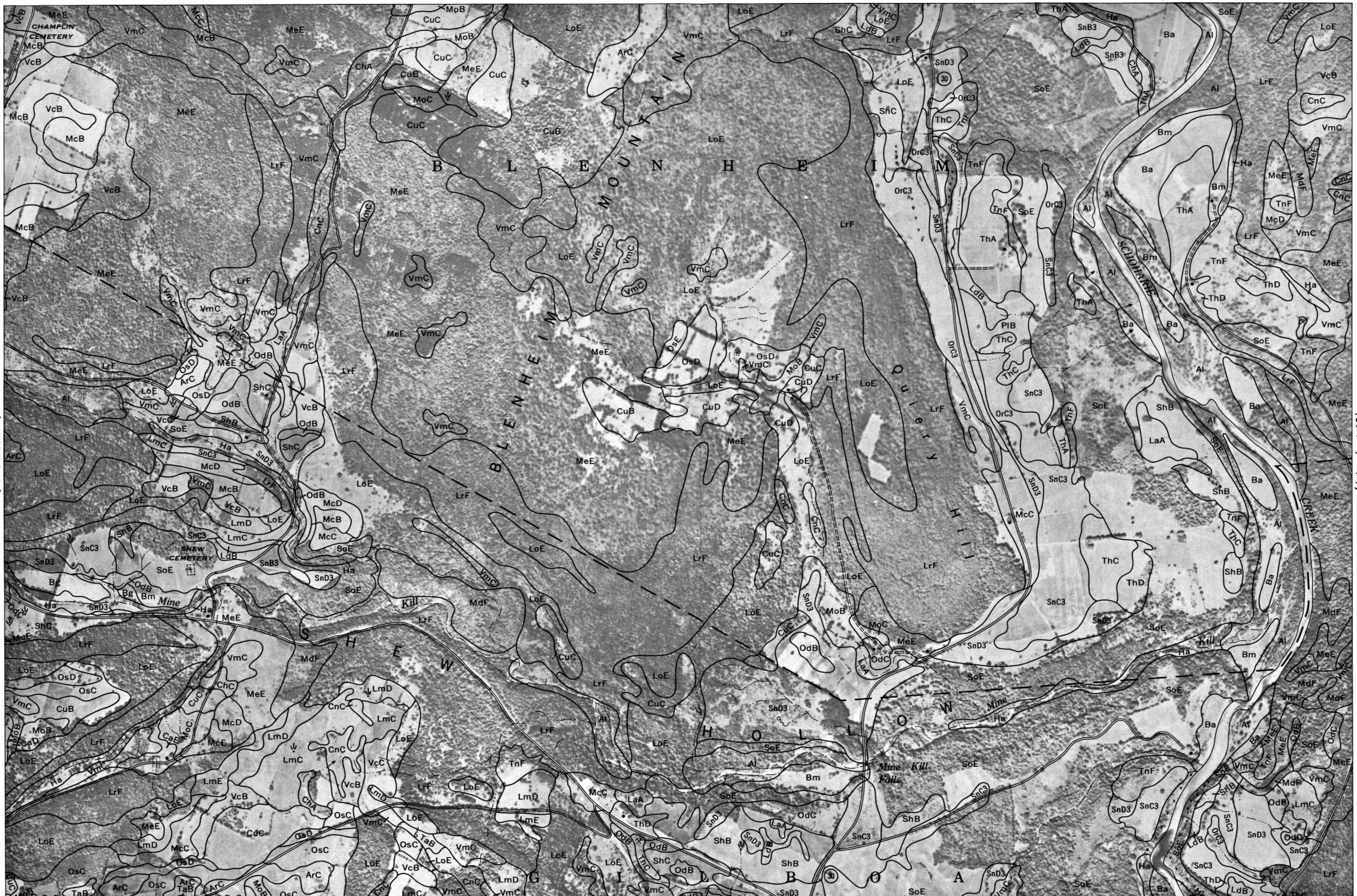
0 5 000 Feet

SCHOHARIE COUNTY, NEW YORK NO. 66

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

(Joins sheet 61)

(Joins sheet 66)



(Joins sheet 68)

(Joins sheet 72)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

(Joins sheet 62)

(Joins sheet 67)

(Joins sheet 69)

(Joins sheet 73)

0 ½ 1 Mile
Scale 1:15 840
0 5 000 Feet

SCHOHARIE COUNTY, NEW YORK NO. 68

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

(Joins sheet 63)

(Joins sheet 68)

(Joins sheet 70)

(Joins sheet 74)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

70

(Joins sheet 64)

N

(Joins sheet 69)

(Joins sheet 75)

0 ½ 1 Mile Scale 1:15 840 0 5 000 Feet

0 ½ 1 Mile

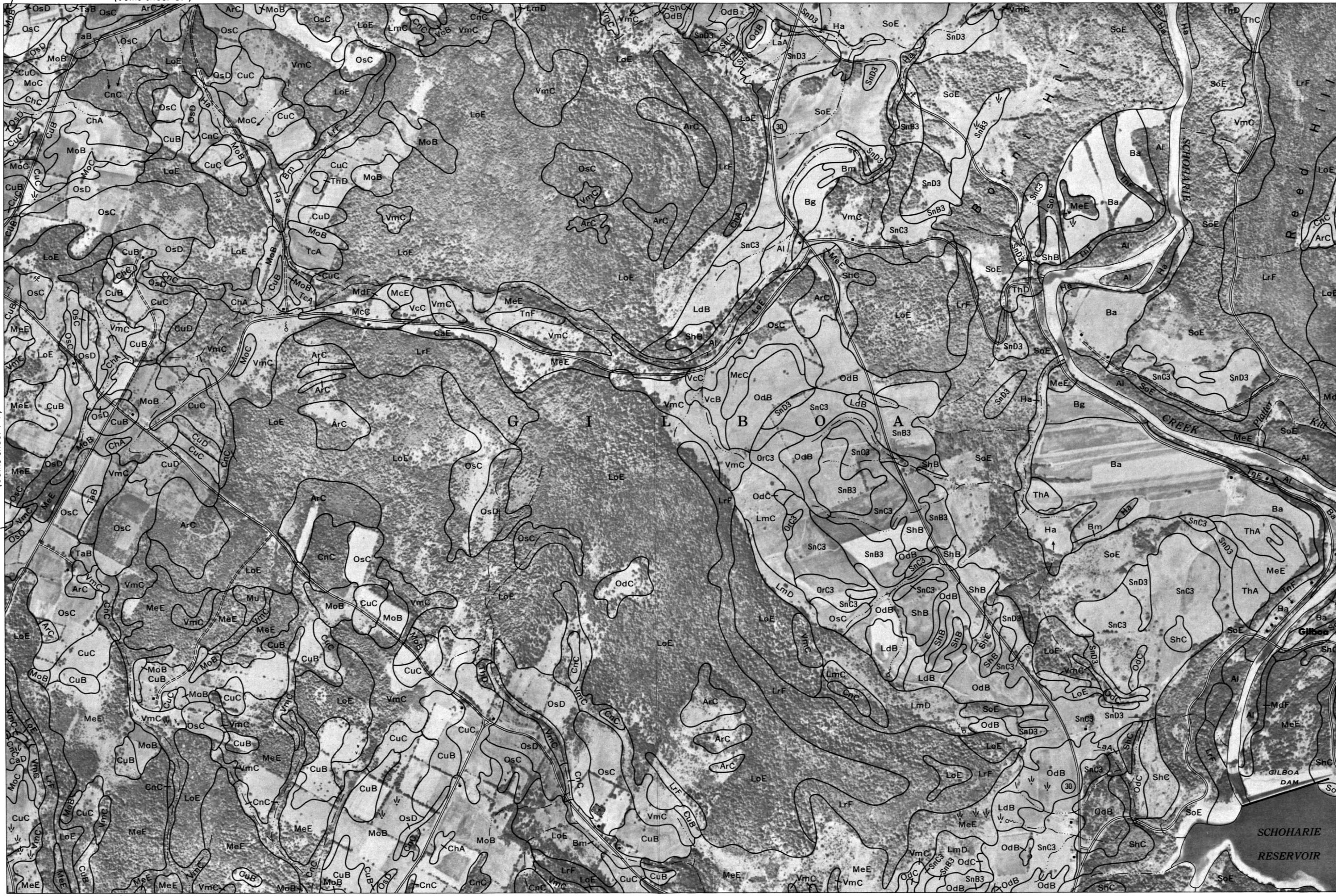
Scale 1:15 840

0 5 000 Feet

72

(Joins sheet 67)

(Joins sheet 71)



(Joins sheet 73)

(Joins sheet 76)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.


(Joins sheet 68)
73
N
(Joins sheet 72)
(Joins sheet 74)
(Joins sheet 77)
G I L B O A
B
O N E S V I L L E
Red Hill
Kill
Platter
SCHOHARIE CR
Gilboa
Central School
SCHOHARIE RESERVOIR
SANDSTONE QUARRY
Stevens Mountain
0
½
1 Mile
Scale 1:15 840
0
5 000 Feet

74

N

(Joins sheet 69)

(Joins sheet 73)

(Joins sheet 75)

(Joins sheet 78)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

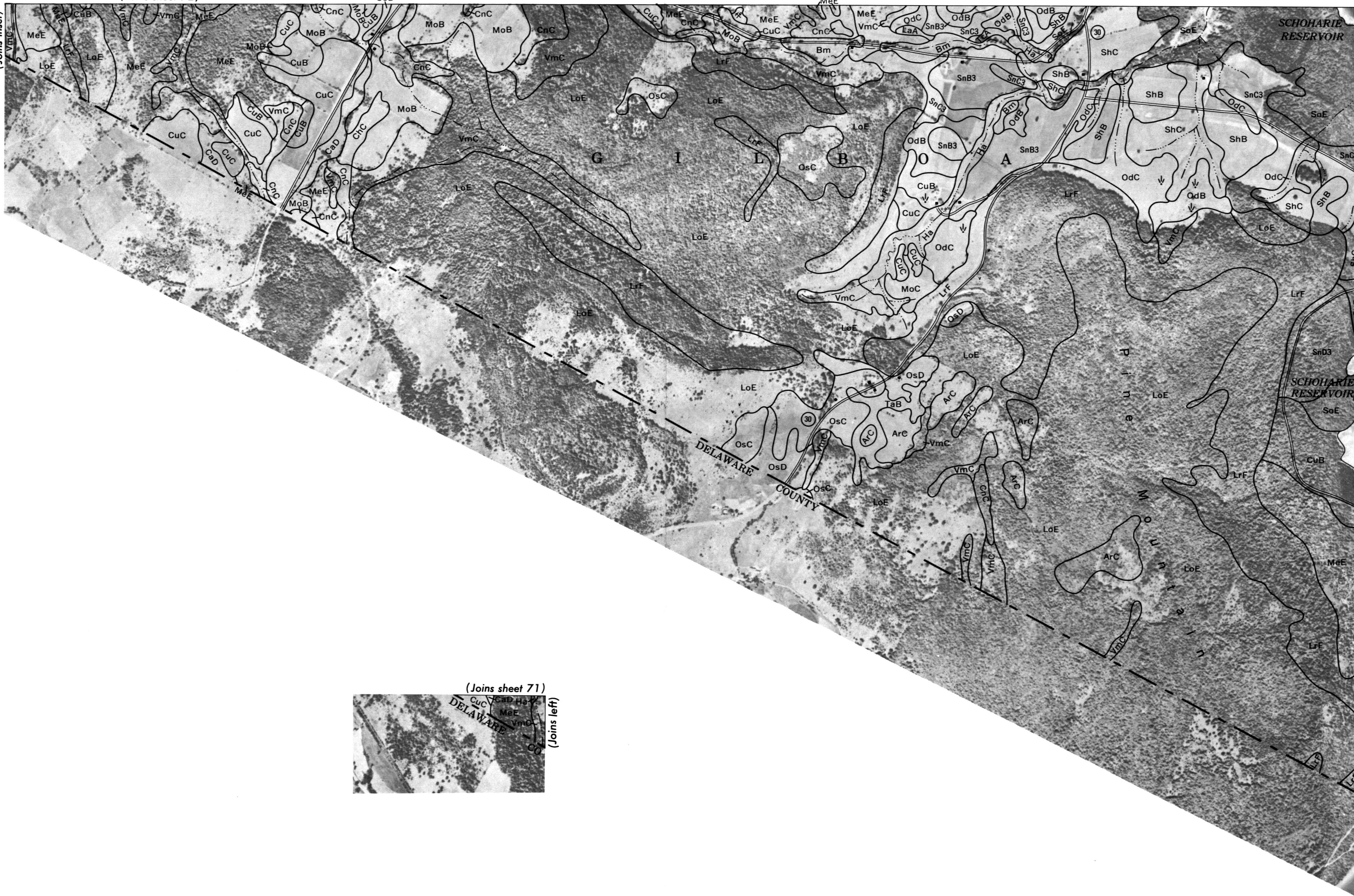
This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

SCHOHARIE COUNTY, NEW YORK NO. 74

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

SCHOHAIRE COUNTY, NEW YORK NO. 75

76



0 ½ 1 Mile Scale 1:15 840 0 5 000 Feet

SCHOHAIRE COUNTY, NEW YORK NO. 76

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

(Joins sheet 73)

77

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

(Joins sheet 76)

(Joins sheet 78)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

SCHOHARIE COUNTY, NEW YORK — SHEET NUMBER 78

0 ½ 1 Mile Scale 1:15 840 0 5 000 Feet

SCHOHAIRE COUNTY, NEW YORK NO. 78

This map is one of a set compiled in 1968 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

(Joins sheet 75)

(Joins sheet 78)

N

0 ½ 1 Mile Scale 1:15 840 0 5 000 Feet

SCHOHARIE COUNTY, NEW YORK
CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads
- Dual
- Good motor
- Poor motor
- Trail

Highway markers
- National Interstate
- U. S.
- State or county

Railroads
- Single track
- Multiple track
- Abandoned

Bridges and crossings
- Road
- Trail, foot
- Railroad
- Ferry (FY)
- Ford (FORD)
- Grade
- R. R. over
- R. R. under

Tunnel

Buildings
- School
- Church

Forest fire or lookout station

Mines and Quarries

Mine dump

Pits, gravel or other

Power line

Pipeline

Cemetery

Dams

Levee

Tanks

Well, oil or gas

BOUNDARIES

- National or state
- County
- Minor civil division
- Reservation
- Land grant
- Small park, cemetery, airport

DRAINAGE

Streams, double-line
- Perennial
- Intermittent

Streams, single-line
- Perennial
- Intermittent
  - Crossable with tillage implements
  - Not crossable with tillage implements
  - Unclassified

Canals and ditches (CANAL)

Lakes and ponds
- Perennial (water, w)
- Intermittent

Wells, water (flowing)

Spring

Marsh or swamp

Wet spot

Alluvial fan

Drainage end

RELIEF

Escarpments
- Bedrock
- Other

Prominent peak

Depressions (Large, Small)
- Unclassified

SOIL SURVEY DATA

- Soil boundary and symbol (Dx)
- Gravel
- Stony, very stony
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land
- Severely eroded spot
- Blowout, wind erosion
- Gully